ELECTRICAL REVIEW

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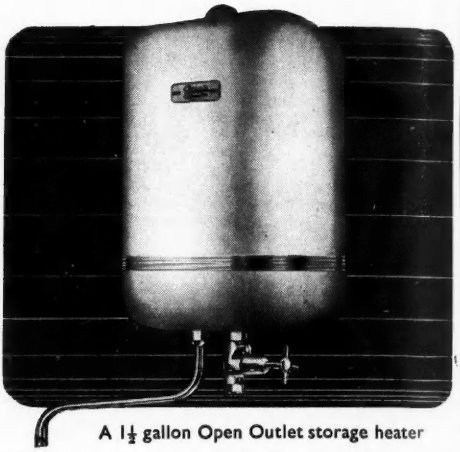

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ELECTRICAL
REVIEW

Vol. CXLVI No. 3782 19TH MAY, 1950

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872

Supply Staffs' Problems

INDECISION CAUSED BY FEAR OF CRITICISM

FEW would disagree that the transition of the electricity supply industry to nationalization has been carried out far more smoothly than even the most optimistic might have anticipated. In fact, if they had not been told, most consumers would not have noticed the change at all, except in so far as it may have involved some modification of charges, necessitated either by increased operating costs (which had little or nothing to do with nationalization) or by the removal of anomalies in adjacent areas.

External Relationships

A little over two years after vesting day the industry appears, to users of electricity at any rate, to have settled down nicely, to all intents and purposes. But would those in the industry agree that everything is as it should be and that the present situation does not leave much to be desired? From the point of view of conditions of service they are almost certainly better off than they were before nationalization, though they may still, in most cases, be overworked. Rather is it in their relationships with the outside world that difficulties and handicaps have arisen to complicate their lives and bring about conditions leading to what is now termed a sense of frustration.

To those who have been accustomed to make their own decisions and assume the responsibility for the results, the position is particularly irksome. Always in the back of their minds is the thought that any actions they may take will run the gauntlet of criticism of all those opposed to the existing set-up and may even become a national issue.

Not only are politicians and the lay Press prone to welcome opportunities of discrediting the Government by finding fault with nationalized industries, but those local authorities which have been deprived of their electricity undertakings still take a fatherly interest in their "offspring" and are highly critical of operation under the new régime. The Consultative Committees, too, provide a means of airing complaints and for that matter consumers are not backward in making known their disapproval in letters to the newspapers.

Lack of Confidence

That there should be this constant watchfulness on the operation of the industry is all to the good. The danger of the situation, however, is that those who are responsible for policy and, in particular, minor decisions should become so apprehensive of possible repercussions that they will develop the so-called "Civil Service" attitude of leaving it to someone higher up the ladder to decide. Indeed, even in such things which before nationalization were done as a matter of routine, this attitude of mind is becoming apparent. Unless this tendency is promptly overcome, the effects will soon

make themselves evident in a serious deterioration in consumer service which has justifiably always been a matter of pride in the industry. But for the fact that we have become so accustomed to delays on account of war conditions, this failing would, indeed, have made itself more noticeable already. The trouble with this sort of thing is its insidiousness and if the electricity supply industry is to maintain its reputation for enterprise and virility steps must be taken to "stop the rot."

BENEFITS FROM RESEARCH

Many electrical contractors believe that research is not their immediate concern. They consider that it is the duty of electricity supply authorities and electrical manufacturers to finance research and apply the results in the improvement of their products. But surely, as Dr. S. Whitehead, director of the Electrical Research Association, contends in this issue, the contractors benefit considerably by these improvements and may be expected to contribute towards the work from which they result. The electrical contractors do already support E.R.A. through their Association. Dr. Whitehead implies, without appealing directly, that greater support would be welcome.

GAS TURBINES

One great advantage of the open-cycle gas turbine is that its capital cost can be related to load factor by the addition or alteration of components to give the most economic overall results. With distillate fuels the most suitable load factor for this country is only of the order of 10 per cent. An important aspect, however, is that British manufacturers will no doubt be required to build them for perhaps relatively small outputs, for continuous running in countries where oil is more plentiful and water may be scarce.

INCREASED PRODUCTION

In a statement to be presented at the annual meeting of C. A. Parsons & Co., Sir Claude Gibb, the chairman, mentions that the company has spent £2,000,000 on the re-equipment of its works since 1945. The results of this are manifest in the company's record of progress: new plan and the study of the best way of using it have considerably raised the output per worker. Sir Claude stresses this as it is so often claimed that increased output arises solely from the workers' extra efforts, and that the workers alone should benefit. Due recognition is given, by additions to their weekly wages, to employees who are called upon for extra exertion. Beyond this a sum of £15,000 has been divided amongst the employees —equivalent to the amount of the Jubilee bonus distributed to the ordinary shareholders.

TRADE WITH CHINA

Events in China continue to threaten foreign trade, and in some directions there has been a total stoppage. The electrical industry is one which not long ago had high hopes of increasing its Chinese business if some sort of stability was reached. Last year exports of electrical goods and apparatus to China showed a drastic decline—from £794,812 in 1948 to £103,779. Conversely there was a substantial rise in shipments to Hong Kong—from £1,180,597 to £1,872,305, the principal items being rubber insulated cables (£263,829), cables with other insulation (£438,404), and domestic radio sets (£107,686). During the first quarter of this year exports of electrical goods to China went down to £7,680 (the value was only £135 in March). Trade with Hong Kong was fairly well maintained at £392,217, but since then the Colony has become progressively disorganized.

ENGINEERS AND OTHERS

Mistakes by engineers are more obvious than those made by most professional people and, as Sir William Larke observed at the function of the Institution of Engineers-in-Charge (reported in this issue), they have to put right their mistakes. It ought to be fully understood by others that this predisposes them to base their decisions on mature thought, the justification for which is advisably committed to writing, and rules out reliance on "hunches." How excellent it would be if Sir William's idea that statesmen should receive a couple of years' training as engineers were capable of realization.

Contractors and Research

Benefits Derived from Co-operative Investigations

By

S. WHITEHEAD,

M.A., Ph.D., M.I.E.E., F.Inst.P.

(Director, Electrical Research Association)

IN the early days of electrical power the engineers responsible for installations were both inventors and investigators. The only prior art on which they could draw came from telegraph, telephone and signalling practice. The fruitful interchange between communication and power engineering still continues, but from the first the essential difference between the main problems became particularly evident in the sphere now covered by the term "electrical contracting."

Before there was any kind of organized or deliberate research very great progress had been made by trials and innovations on the job itself, which was to be expected in a young industry laying its own foundations of technique. As it grew towards its great national stature the emphasis changed from achieving fairly reliable operation to exploiting smaller differentials. These depended as much on the application of scientific principles to known basic design as on new invention, so standardization became more important than minor improvements, requiring significant alterations to general practice. This situation provided fruitful soil for the growth of co-operative research, some examples of which are mentioned below.

Conductor Ratings

The current or power ratings of conductors concern alike supply authorities, contractors, manufacturers and consumers. They avoid both the overloading of installations and the need to use unnecessarily heavy conductors and provide a means of real, not spurious, comparison of alternative types. The Electrical Research Association (E.R.A.) has developed the scientific basis of rating—at a recent A.I.E.E. convention it was able to show that American results were in accord with principles adopted in this country some years ago—and has issued cable ratings in papers and reports and in the widely used form of the E.R.A. tables of current ratings for cables for transmission and distribution, the I.E.E. Wiring Regulations for buildings and the I.E.E. Regulations for ships.

The enormous number of installations so covered is not always realized. They range from small cables in plaster to the largest underground cables, from outdoor wiring to overhead lines; they include features such as the disposition of cables on or in walls, ceilings, or floors; the effect of neighbouring structural steelwork; the effect of sun or soil; and mutual heating, particularly important in the case of the large groups of cables in ships which have to be rated according to the appropriate diversity factor. In recent years there have been included permissible transient overloads and short-circuit currents. A unique handbook is now being issued on the complete electrical properties of bare conductor installations, e.g., overhead lines.

As long as new types and methods emerge this useful work must continue. In the past the long-term experiments of manufacturers and accumulated experience of users showed the limiting mechanical and thermal conditions which the conductors could be expected to withstand as long as need be. Accelerated ageing tests are essentially difficult because acceleration usually needs conditions absent in practice, but the appearance of novel types of cable seems to require an agreed study of acceleration so as to shorten the period before the reli-

ability and limits of a new type can be established.

The security of an electrical installation depends ultimately on good workmanship, but it must be applied to scientific design and sound practice. Nowhere is this better exemplified than in the Association's work on the continuity of metal conduit and on accessories, such as earthing clamps, from which a new British Standard has resulted.

The more general subject of protection against shock and fire risks has two aspects. One is the analysis of the nature of the risks and the engineering principles by which they can be minimized in various systems of protection. The other aspect is how to choose the most economic method of attaining a given standard of performance.

Earthing Methods

In consumer earthing, the existence of a good earth ready to hand, such as cable sheaths or a metal water system, solves the main problem of direct earthing, but elsewhere cost insists on recourse to competing systems such as earth leakage circuit-breakers, protective multiple earthing, separate earth-wire, or the like.

The engineering analysis of these systems has been made, but the E.R.A. has recently broken new ground in an operational research to find how much safety can be purchased by a given expenditure on any method and the levels at which there is a diminishing return of safety for further expenditure. Where security depends mainly upon insulation, the E.R.A. is studying means of detecting incipient breakdown so that potentially faulty gear can be taken out of service, but this can probably more easily be applied by the supply engineer than the contractor.

Switches and Fuses

The great advances in switchgear based on E.R.A. inventions concern higher powers than usually come into contracting, but research on contactor operation and life are entirely relevant, particularly since a very high duty is often nowadays expected from contactors. Fuses are very much the contractor's business. The standards to which he works for fuses are almost entirely based on E.R.A. work over more than 25 years and the designs are largely inspired either by E.R.A. researches or come from manufacturing progress depending on methods of study which the E.R.A. introduced.

Water- and space-heating investigations are fairly recent in the E.R.A., but already a solution has been obtained for the problem of transient electric heating, which gained some publicity in pointing out the advantages of thin wall treatments of high thermal resistivity and reflecting wall papers. Another completed subject is floor heating by buried cables, including the advantages of thermal insulation under the cables. Although water-heating studies have mainly confirmed the best existing practice, a method was indicated by which a much higher proportion of the hot water in a storage tank could be taken before mixing with incoming cold water cooled it too far. The clarification of scale formation and its inhibition has suggested some promising methods. Airing and drying problems are now being investigated.

The Association also had the first heat pump adapted for research and now has two with facilities for studying cases of heat extraction from a river, a tank or a well, or directly from the earth. It is hoped to install a working heat pump at the E.R.A. field station at Shinfield, where cognizance may be taken of the heat from decaying animal and vegetable refuse.

Rural Work

This is not the place to detail the Association's horticultural, agricultural, dairy and poultry work, now partly supported by the Ministry of Agriculture. Suffice it to say that the principal object so far has been the production of methods and designs involving simple installations of cheap materials and economical components, from which the contractor must benefit. For example, soil-heating requires merely the installation of galvanized iron wire in the ground with outdoor type connecting cables and a transformer. The electrode method of soil sterilization comprises a grid of earthing spikes. The cold air crop-dryer consists mainly of a blower and trunking. Other examples are the small hammer mill and the storage steam raiser for dairies. Small-scale generation by

wind power also concerns the contractor, although large-scale generation has a more specialized interest.

The Association has not done very much about lighting, but reference can be made to its study of lamp fittings to avoid overheating from hot air currents, in connection with which interesting developments were made in Schlieren photography.

It is believed that regulations about radio interference made under the Wireless Telegraphy Act (1949) will usually be satisfied by compliance with British Standards (or other specifications) of appliances as delivered by the manufacturer. But many installations will have each to be treated as a whole and not by referring each component to its particular maker. It is also to be noted that according to Post Office statistics a significant proportion of complaints arise from faulty wiring installations. Accordingly, it would seem that the contractor will not infrequently have to accept responsibility with respect to the liability of the final purchaser. The many years' work of the E.R.A. on installations of this kind will then become prominent.

There are many subjects of co-operative research which are mainly concerned with electricity supply but affect contracting. For instance, the national Sampling Survey, particularly of domestic consumers, shows the distribution, mode of use and possible demand for various types of appliance—information which is of interest to contractors.

It is impossible to estimate how much has been spent on these subjects of co-operative research in the 33 years since the I.E.E. and B.E.A.M.A. Research Committees were amalgamated to found the Electrical Research Association because the cost cannot be apportioned as between the interests affected by the results. A proposal has been made that a research was economically sound if the yearly saving, or profit from activities essentially requiring the results, exceeded the total cost of the research from start to finish. On this basis the investigations mentioned have justified themselves several times over, which is usually held to indicate that further research will probably also be justified. This is certainly the belief of the E.R.A., but research is costly both in money and in the technical advice of those who co-operate. This has been appreciated by the manufacturing and supply industries, but is not, perhaps, so generally realized in the contracting industry, which has no inconsiderable share in the benefits.

The American Attitude

AT the monthly luncheon of the American Chamber of Commerce in London held at the Savoy Hotel on 10th May, the president, Mr. Wallace B. Phillips, was in the chair and Mr. W. R. Herod, president of the International General Electric Co. of New York was the guest of honour.

Addressing the company Mr. Herod surveyed existing international conditions and current trends particularly as they affected American import and export trade. The speaker referred to the great expansion in American production and the recovery of the industrial nations of Europe and discussed the possibilities of redressing the balance between the United States and other countries. He mentioned the reluctance of both American and British investors to place their money in countries where the "climate" was unreasonable and said that the aim must be to improve conditions for investors.

In a reference to the recent Seattle transformer tenders Mr. Herod contended that if the prices had been right and the specifications adhered to the order would have gone to the United Kingdom; there had been no nationalistic discrimination. British manufacturers were now familiarizing themselves with American merchandizing and prfoduction techniques and product designs and they were fortunate in having as chairman of the Dollar Exports Board so discerning a person as Sir Cecil Weir. It was easier to sell Americans what they wanted than to persuade them to buy what was wanted in Britain.

In conclusion Mr. Herod expressed the opinion that the future tendency would be for American exports to decrease while those of Great Britain and other industrialized European countries continued to expand. There was definitely an opportunity for import trade in items "plus" to the American economy, but less opportunity and perhaps opposition for finished manufactures whose main advantage was lower cost based only on lower wages.

VIEWS on the NEWS

By REFLECTOR

THERE was a businesslike atmosphere at the E.T.U. Conference which opened on Monday at the West Cliff Hall, Ramsgate. The delegates were soon seriously discussing subjects ranging from the policy of the Union's journal to the outlawing of the atom bomb. The bias of the first day's proceedings was political (in vein not characterized by the platform setting of blue hydrangeas). On the lighter side, a delegate questioned whether the choice of "Electron" for the new name of the Union's journal was a happy one, being "negative." Or had it, he wondered, any association with the word electuary—"a purgative medicine compounded with some sweet substances." Suitably impressed, the general secretary (Mr. W. Stevens) promised to consider whether the title should be altered to "Proton."

★ ★ ★

It is customary for cinemas to change their films at least weekly, but the film transmitted each morning from the Alexandra Palace to enable dealers to demonstrate their television receivers has had a record run; it has been going, with few changes, since June, 1946. Since last Monday, however, there has been a change of programme, to the great relief of dealers and, no doubt, to those prospective customers who are going the round of sets before taking the plunge.

★ ★ ★

One of England's few hydro-electric stations is closing down after fifty-six years' service. It is the small plant on the River Teme which belonged to the Worcester Corporation until 1948. The Midlands Electricity Board, which acquired it, finds that the waterwheels need so much spent on them that it will be cheaper to close the plant. The Powick station was put into commission in 1894. Mr. C. M. Shaw, who became the city electrical engineer in 1904, made a number of improvements and he claims that in one year the Powick plant generated over a million kWh at the rate of from 5 to 10 kWh a penny when steam station costs were between ¾d to 1d per kWh. Mr. Shaw, who retired in 1941, now lives at Callow End, Worcestershire.

★ ★ ★

For some time the development of hydro-electric power from the River Erne has been under consideration of the Electricity Supply Board of the Irish Republic but there has been delay because the scheme must necessarily be a joint one with Northern Ireland. The two lakes which form an essential part of the scheme Lough Erne and Upper Lough Erne are in Northern Ireland and the river flowing out of them crosses the border into south-west Donegal. It is now reported that agreement has been reached between the Electricity Supply Board and the Ulster Ministry of Finance which, it is hoped, will be ratified by both Governments. It is pleasing to see a breach in the largely artificial wall between North and South.

★ ★ ★

An interesting suggestion was made during the House of Lords debate on the Public Utilities Street Works Bill which lays down a uniform code of procedure in the matter of breaking up streets for cables, etc. The Earl of Selkirk pointed out that a penalty of £50 for a breach of the regulations meant nothing to a nationalized industry. How, then, he asked, was a local authority to "give a jolt" to, say, the British Electricity Authority? Lord Calverley interjected: "Send them to gaol." Much as this would be appreciated by some of the B.E.A.'s critics, I doubt whether we shall ever see Lord Citrine and his colleagues "serving a stretch" for illegally breaking into a road.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

Power Transformer Design

IN your issue of 5th May you have reported some remarks of mine made during the discussion on the paper on "Power Transformer Design." My appeal for reduced costs was faithfully reported, but you were naturally unable to include the performance data which I showed on a slide and which I considered to be the most important part of my contribution.

The point which I tried to make was that during the past three years there has been a total of 109 faults in some 800 transmission transformers; of this number 18 faults were due to electrical breakdown in the transformer windings, only three of which were believed to be due to lightning. There were 37 faults in the main connections of on-load tap change equipment and 54 faults caused by defects in the control circuits or by mechanical failures in tap changers.

My conclusion was that although the surge strength of transformer windings is of paramount importance, from the operational point of view there is a good case for improving the performance of other parts of transformers.

*London, W.*1. R. W. FLUX.

Service Qualifications

MR. MILNE (in your issue of 5th May) does not appear to be familiar with the practical and theoretical standards of service tradesmen when he states that their Service qualifications are of little use in civil life.

I did not secure a copy of the *Electrical Review* of 28th April, consequently I cannot offer any comment on the article by "Reflector" on the subject of Service qualifications, but with regard to military tradesmen I should say that if Mr. Milne were to pay a visit to any of the electrical branches of a few of the military technical training establishments, such as the School of Military Engineering, the Military College of Science or the Army Apprentices' School, I am convinced that he would see sufficient of the work and training carried out in these establishments to justify revision of the opinions which he expressed in his letter.

Admittedly, there are trades in the Services which have virtually no equivalent in civilian industry, such trades being peculiar to their own particular branch of the Service. There are, of course, minor trades too, and in this connection men who have had short courses on the operation and maintenance of specialized electrical equipment could hardly be regarded as electricians on their return to civilian life; nevertheless, it is possible that there are the odd few who, on the strength of such training, may be tempted to regard themselves as tradesmen in the electrical field. After all, a person does not realize his shortcomings until he is capable of appreciating how much he does not know and it is unfortunate that the reputation of the bona fide Service tradesman is brought to question by the activities, in civilian life, of the lower-grade tradesman. I would suggest, if Mr. Milne speaks from personal experience, that he bases his views on his observation of the latter type.

I am connected, as a civilian, with the training of army apprentice tradesmen and I can assure Mr. Milne that these boys go through a much broader field of training over a wider range of subjects than is normal in the case of their civilian counterparts. The whole scheme of training for electricians is based on general electrical engineering practice with the inclusion of such subjects as (to quote only a few), electronics, underground cable and overhead line systems, cable jointing, auto-electrical equipment, i.c. and c.i. engines, etc., and, in general, their training qualifies them for something better in civilian life than the func-

tion of electrician, even with a reputable firm of contractors.

Mr. Milne's analogy, if I read it as such, of the armature winder and the "outside man" is rather a poor one, and in no way reflects the comparative case of the Service tradesman with his opposite number in civilian life. It is perhaps not generally realized that the Service electrician is capable, on leaving the Forces, of fitting himself into more than just one branch of the trade.

I must also dispute Mr. Milne's remarks on the shipyard electrician; he gains a more extensive experience in his training than does the contractor's apprentice. I would not wish it to be thought that I am condemning the contractor's electrician; far from it. I have met some very excellent tradesmen in this field and they are good electricians in their own particular line; but I have always found that the shipyard electrician is more versatile than the fellow who remains in the contractor's groove all his life. I speak with some knowledge on this subject, since I have been concerned with industrial contract work in the past, on something more than a small scale, and I served my apprenticeship in a shipyard.

Harrogate. L. MIDDLEMISS,
Civilian Senior Instructor.

Quote the Reference

THIS is an open letter to manufacturers, wholesalers, etc.:—

"For the special attention of departmental heads and typists: Why do you not quote your correspondents' letter references in your replies? You carefully print on your stationery 'Your ref. ——' but never bother to quote it although you are often quite insistent, and rightly so, that your own reference shall be quoted and therefore appreciate the necessity. We are only a small organization but some days can elapse before a letter is finally seen by the appropriate person unless it is especially handed to first one and then another."

GRIFFIN BROS. ELECTRICAL, LTD.,
R. J. GRIFFIN,
Managing Director.
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West Indies Trade

THE proposed federation of the British West Indies concerns territory which last year purchased British electrical goods and apparatus to a total value of approximately £1,200,000, in addition to a quantity of electrical machinery. Trinidad is the most important market and is likely to remain so. Petroleum is the island's most valuable asset although the sugar industry is the largest single employer of labour. Trinidad is engaged in developing secondary industries, particularly dollar saving and dollar earning, provided they are likely to prove economic, and the authorities will consider applications for concessions in respect of import duty on plant and equipment.

The following are the Electricity Commission's requirements as to voltage, etc., for lighting and power: Lighting and apparatus less than 1,650 W: 115 V, 60 c/s; domestic appliances (including ranges) 1,650 W up to 10 kW: 230 V, 60 c/s.

Trinidad and Jamaica together account for 75 per cent of the electrical import trade of the British West Indies. Jamaica's imports of electrical machinery, apparatus and appliances in 1948 were valued at £663,000, an increase of £183,000 on 1947. The share of the United Kingdom in Jamaica's import trade as a whole was 39 per cent in 1948 against 20 per cent in 1947. Supplies from both the United States and Canada declined.

Electricity in Kingston, the capital, and the surrounding area, is 40 c/s, 110 V for lighting and refrigeration and 220 V for heating. In some areas outside Kingston the supply is 110 V 60 c/s. There is electricity in all the main towns.

Barbados, which took 10 per cent of the total United Kingdom imports into the British West Indies, comes next in importance. Imports of electrical goods in 1948 were valued at £190,000 against £130,000 in 1947, with Great Britain supplying approximately four-fifths of the total. Towns have electricity, but not all the outlying districts, supply being at 110 V, 50 c/s.

School Lighting

HULL Corporation proposes to spend £12,000 during the financial year 1950/51 for the installation of electric lighting at certain schools at present lit by gas. It is estimated that this expenditure will cover the cost of work to be carried out at seven schools.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Edison Swan Electric Co., Ltd., announces that **Mr. R. K. Cox,** late of the British Thomson-Houston Co., Ltd., Birmingham, has been appointed manager of the Ediswan Sheffield district office.

The General Electric Co., Ltd., has appointed **Mr. E. G. O. Ridgwell** as packaging controller, a new position. Mr. Ridgwell, who was recently elected vice-chairman of the Southern Area of the Institute of Packaging joined the G.E.C. in 1948 was appointed to deal with the packaging problems of the company. Last December he represented B.E.A.M.A. on the specialist packaging team sent to America under the sponsorship of the Anglo-American Council on Productivity. Mr. Ridgwell also represents B.E.A.M.A. on the various committees at present revising B.S. 1133—the Packaging Code, and on the Packaging Sub-Committee of the Overseas Policy Committee of the F.B.I. His duties with the company include export packing, the prepackaging of all the company's goods, carton printing and design, and the bulk purchase of packaging materials.

Mr. E. G. O. Ridgwell

Mr. Henry Chisholm, managing director of A.C. Cossor, Ltd., has been appointed chairman of the Corby Development Corporation by the Minister of Town and Country Planning.

Dr. L. J. Kettle (for many years city electrical engineer of Dublin), **Mr. L. Forde** and **Mr. Henry Golden** have retired from the Electricity Supply Board, Dublin, upon the expiry of their period of appointment.

Before sailing from this country to take up an appointment with the Central Electricity Board of Malaya, **Mr. R. G. Mainwaring,** A.M.I.E.E., who has been section engineer for Dolgelly and Machynlleth (North Wales), was presented with a fountain pen from the staffs at Dolgelly, Towyn and Machynlleth.

Mr. T. E. Webster has been appointed managing director of the West London Timber & Moulding Co., Ltd., Chiswick, following the death of Mr. G. H. Deene. Mr. Webster, who is manager of the Electrical Woodware Department, has been associated with the company for the past twenty-seven years and has been a director for fourteen years.

Mr. V. H. C. Phillips, sales manager of Kent Bros. Electric Wire Co. & E. H. Phillips, Ltd., has been appointed a director.

Mr. E. N. B. Hammond has been appointed engineer-in-charge of the B.B.C.'s Norwich transmitting station, which was opened last year. Mr. Hammond has been with the B.B.C. for 16 years. From 1943 to 1947 he was engineer-in-charge of the Clevedon station, near Bristol, after which he was transferred to Daventry in charge of the short-wave aerial system.

Mr. H. T. J. Edwards, who was for a number of years with the Sloan Electrical Co., Ltd., has now joined the staff of the British Electrical & Manufacturing Co., Ltd., as sales engineer at Maidstone House, Berners Street, W.1.

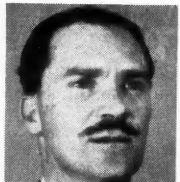
Mr. J. Johnson Smith, M.I.E.E., has been appointed to the board of the Electric Construction Co., Ltd., Wolverhampton. Mr. Johnson Smith joined the company in 1945 as London manager, in which position he will continue, being responsible for the sales organization in London and the South of England. Before 1945 he was with Johnson & Phillips, Ltd., as London manager.

Mr. J. Johnson Smith

Mr. D. G. Maynard, of the Manchester branch of Crompton Parkinson, Ltd., has been appointed textile application specialist in succession to **Mr. F. J. Stevenson,** who retired in March. Mr. Maynard joined Crompton Parkinson, Ltd., in Glasgow as plant sales engineer on being demobilized from the R.A.F. in 1946. He was trans-

ferred to the Manchester branch in October, 1947, and was subsequently appointed assistant to Mr. F. J. Stevenson.

Mr. K. Howard has been appointed publicity manager to Ekco-Ensign Electric, Ltd. Since 1945 Mr. Howard has been responsible for dealer liaison in the main E. K. Cole Publicity Department. Ekco-Ensign are now forming a separate publicity unit under the direct control of **Mr. J. F. Young,** Ekco-Ensign managing director, responsible for all lighting advertising and publicity requirements.



Mr. K. Howard

Ekco-Ensign Electric, Ltd., announces the appointment of **Mr. C. D. T. Bell** as sales manager in Birmingham and the Midland Counties. Mr. Bell, who has been associated with electric lamps and lighting for a number of years, was formerly Midland area manager for Smart & Brown (Engineers), Ltd.

Mr. M. H. Hall has been appointed engineer-in-charge of the new B.B.C. television studio centre at Lime Grove, Shepherds Bush, London. Mr. Hall has been with the B.B.C. since 1927 and was a member of the original staff at Alexandra Palace when the high-definition television service started in 1936. During the war he was assistant engineer-in-charge successively of the Start Point and Woofferton transmitting stations. In 1946 he returned to Alexandra Palace, becoming assistant engineer-in-charge there at the beginning of this year.

Mr. A. J. C. DeRenzi, hon. secretary of the National Municipal Electricity Consumers' Association, and formerly borough electrical engineer of Newcastle (Staffs), was elected a member of the Newcastle Council at last week's municipal elections.

"ELECTRICAL WHO'S WHO"

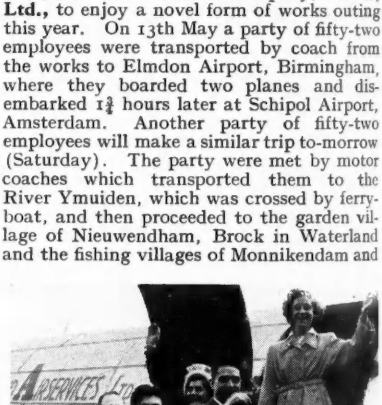
Particulars of the careers and positions of about 2,600 leading men and women in all branches of the electrical industry are contained in the "Electrical Who's Who" now obtainable from the *Electrical Review*, Dorset House, Stamford Street, London, S.E.1, or booksellers, price 12s. 6d. (postage 6d.).

Mr. V. L. Breeze has been co-opted to the board of Allen West & Co., Ltd., in place of **Mr. F. E. Colchester,** who has retired, and **Mr. A. E. Owen** has been appointed in place of **Mr. H. Tonkinson.**

Mr. F. W. Purse informs us that he is moving on 30th May to The Warren, East Lane, West Horsley, Surrey (telephone: East Horsley 2251).

On Friday and Saturday last the **Johnson Matthey Dramatic Society** presented "To Kill a Cat," by Roland Pertwee and Harold Dearden at King George's Hall, Tottenham Court Road, London. This comedy-thriller provides excellent opportunities for contrasts in character and the members of the cast appreciated them. The hint of coming tragedy was skilfully conveyed, and the climax of the last act was played with great effect. We were particularly impressed by the performances of Ralph Lovell, Violet Thornton, Lillian Brandon and Betty Slimming. First rate performances were also given by Eileen Hunt, Fred Flood, John Wiltshire, Joe Allery, Herbert Brock and Tom Bearwish.

Modern methods of transport have made it possible for employees of **George Ellison, Ltd.,** and their associate company, **Tufnol, Ltd.,** to enjoy a novel form of works outing this year. On 13th May a party of fifty-two employees were transported by coach from the works to Elmdon Airport, Birmingham, where they boarded two planes and disembarked 1¾ hours later at Schipol Airport, Amsterdam. Another party of fifty-two employees will make a similar trip to-morrow (Saturday). The party were met by motor coaches which transported them to the River Ymuiden, which was crossed by ferry-boat, and then proceeded to the garden village of Nieuwendham, Brock in Waterland and the fishing villages of Monnikendam and



George Ellison employees embarking at Elmdon Airport, Birmingham, for a flying "works outing" to Holland last week

Volendam. **Returning to Amsterdam,** lunch was taken at the Schiller Hotel, after which a motor launch took the visitors along the canals on an hour's sightseeing tour of Amsterdam. All were then left to follow their own inclinations. Dinner was taken at about 8 p.m., at the airport restaurant, after which the party flew back to Elmdon.

Over 700 visitors attended the "Spring Show" of the **G.E.C. Musical Society,** held at Magnet House, Kingsway, W.C.2, during the three nights' run from 25th to 27th April. Produced by Norma Howell, the programme contained seventeen separate items, one of which, "Holy City," was sung by Miss Howell herself, ably backed by the G.E.C. chorus of thirty-five voices. A selection of western songs grouped under the title "Giddy Up," was warmly received, as was "Montmartre," which was notable for a contribution by Douglas Side sung in Italian. Items were also given by Irene Roker and Jimmy Gibson, and Roma Hickman. The musical director of the show was J. Morgan Wilson, who was at the piano with Ron Powell. The guests of honour included directors of the company and the Hon. Mrs. Gamage.

On 13th May, **W. T. Glover & Co., Ltd.,** held a visitors' day at their Trafford Park, Manchester, works, for which the management provided facilities which enabled employees to invite their friends and relations to tour the factory. The management provided only the facilities and made no special effort apart from the brochure to describe either the machines or the processes. The employees in each department, on their own initiative, described their particular plant, machines and products.

A skeleton plant was in operation throughout the factory and manned by volunteers showing the manufacture of all classes of cables from wire drawing to the finished product. The company, in addition, arranged an exhibition of materials used, together with cable accessories, in part of the canteen. The laboratories carried out the routine work on quality control during the cable manufacturing and showed their facilities for the development of new products.

The Mayor and Mayoress of Stretford paid an official visit during the afternoon and were received by Mr. D. T. Hollingsworth, general manager, Mrs. Hollingsworth and Mr. and Mrs. K. S. Brazier, and on behalf of the employees by Mr. and Mrs. Moores and Mr. and Mrs. Eckersley.

WILLS

Mr. A. H. Meysey-Thompson, J.P., M.Inst.C.E., one of the founders and a former vice-chairman of the Yorkshire Electric Power Co., who died on 5th February, left £26,317 gross (£26,215 net).

Mr. G. W. Wood, managing director of Stuart Electrical Co., Ltd., who died on 13th November, left £27,141 gross (£26,207 net).

Mr. J. S. Nodes, chief accountant of the East Midlands Electricity Board and formerly district accountant with the Central Electricity Board, who died on 22nd December, left £6,043 gross (£3,598 net).

Mr. A. L. Coward, manager of Highfield and Roger Smith, consulting engineers, of London and Birmingham, who died on 14th March last, left £9,957.

New E.D.A. Films

AT a gathering including many representatives of agricultural interests on 11th May, Lord Citrine, as president of the British Electrical Development Association, introduced a showing of four E.D.A. films. In doing so he expressed the British Electricity Authority's desire to extend its supplies to rural areas as rapidly as possible, but explained the difficulties which at present stood in the way. Lord Citrine was seen and heard again in the first of the films, "More Power," in which he made an excellent survey of the B.E.A.'s construction programme, illustrated by shots of the stations now being erected, switching and transforming stations, and the manufacture of equipment.

Next came "Fifty Acres," telling in a very human way the story of the transformation of a small farm from poverty to prosperity by electrification. There followed two films of a technical character, designed to instruct the up-to-date farmer and agricultural student who desires to know something of the nature of electrical equipment, apart from its actual operation. The first, "The Line to Take," is an attempt by an Electricity Board's engineer to explain to a young farmer why, in general, a single-phase supply to an average farm is as satisfactory as three-phase. It involves diagrams depicting the "action" in single- and three-phase circuits, and the prints are illustrated by views of farm machinery in operation. "Power on the Farmstead" is the non-explanatory title of a film explaining the forces which actuate an induction motor in an ingenious and simple manner.

Mr. H. Nimmo, chairman of the E.D.A. Rural Electrification Committee, provided an epilogue to the programme, saying that the demand for the Association's educational films had proved very gratifying and justified the work which had been put into them.

Heaviside Centenary

Commemorative Meetings at the Institution of Electrical Engineers

ON Thursday of this week, 18th May, it was just a hundred years since Oliver Heaviside was born at Camden Town in London and to mark the occasion the Institution of Electrical Engineers held special commemorative meetings in the lecture theatre. The President of the Institution, Prof. E. B. Moullin, acted as chairman and was supported by the President of the Royal Society, Sir Robert Robinson. It is also interesting to note that at the same time the Council has established a permanent memorial in the form of a Heaviside Premium, value £10, to be awarded annually for the best paper containing detailed mathematical treatment.

At the first meeting, on Thursday afternoon, Sir George Lee gave a lecture entitled "Heaviside the Man," which was followed by tributes to Heaviside from Sir Edward Appleton, Sir Archibald J. Gill, Prof. Harold Jeffreys, Dr. G. F. C. Searle, Sir Edmund Whittaker and others.

Mathematical Genius

Like many great men Heaviside received nothing beyond an elementary school education, but through his own efforts he became one of the pioneers of electrical communication, a mathematical genius who laid the foundations of electrical wave propagation truly on the experimental work of Faraday and the scientific theories enunciated by Maxwell.

In his personality he was not a normal individual and the saying that "genius is akin to madness" represents a fair description of him. Dr. Silberstein, who assisted him in preparing the final volume of "Electromagnetic Theory," said he liked to work in a room that was "hotter than hell," a peculiarity which was also shared by the great French mathematician, Fourier.

Although he started work in 1868 as an ordinary telegraph operator he soon absorbed all the mathematical methods

Oliver Heaviside at the age of forty

current at that time and before long he was filling the pages of the *Electrician* with papers which were far too difficult for most readers of that journal. They were not alone, for the referees of the Royal Society had the same trouble.

In 1874 he was elected an associate member of the Society of Telegraph Engineers, later the I.E.E., and in the same year he returned to live with his parents in London, where he did most of his original work. In 1876 he was elected to the Council of the Society of Telegraph Engineers, but did not attend a single meeting and in 1881, because he was unable to pay his subscription, his name was struck off the register.

Early in his studies he discovered that a.c. circuits could be treated by the rules for d.c. if the inductances were considered as resistances of the form $j\omega L$ and capacitances as $\frac{1}{j\omega C}$, the algebraic operations being performed according to the rules of complex numbers. Later, he established the present-day method of analysing alternating currents, about 15 years before a.c. came into commercial use.

In dealing with transients he used the

Fourier theorem, which expresses a transient as the sum of an infinite number of steady state solutions. The difficulty of dealing with infinity is overcome by assuming that there are upper and lower frequency limits, this method now being normally used in telephone mathematics.

After the death of his parents, Heaviside went in 1909 to live with his sister-in-law at Homefield, Torquay, where he remained until his death in 1925.

Meanwhile, the telephone had been invented and it captured the mathematical interest of Heaviside, his great achievement being the formulation of laws governing the propagation of telephone and telegraph signals on wires and cables. In particular he pointed out the importance of inductance for counteracting the electrostatic capacitance of the circuits.

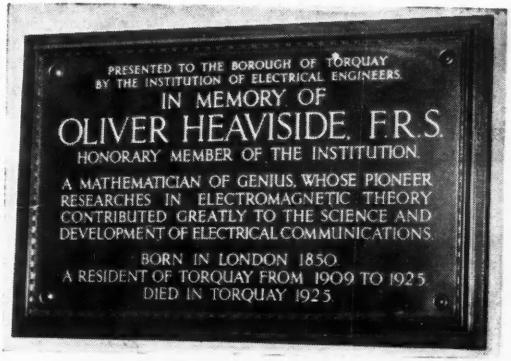
Further interesting examples of his work involved the setting out of the conditions for the distortionless transmission of speech, which is unfortunately not a practical proposition for economic reasons, and the problem of reflections in telephone circuits, this being dealt with either by 4-wire circuits, in which the go and return paths are kept separate or by vacuum-tube devices designed to block the return path. In his work on electric wave propagation Heaviside also showed how the waves are reflected from conduction obstacles, a condition subsequently used in radar.

In the main, Heaviside's work was not appreciated during his lifetime because of its great difficulty, but it is some consolation to know that he was the first recipient of the Faraday Medal and that the President of the I.E.E. went specially to his home at Torquay to present it.

Towards the end Heaviside lived a very lonely and poverty-stricken existence, cooking his own food and suffering from indifferent health. On February 3rd, 1925, he died at Mount Stuart Nursing Home and was buried at Paignton. Although he was such a quarrelsome individual the people at the nursing home where he spent his last few days said he was "such a dear old man." This perhaps removes the impression of irascibility given by many of his later letters.

At the second meeting, held on Thursday evening, Prof. Willis Jackson presented a paper giving "An Appreciation Of Heaviside's Contribution To Electromagnetic Theory." The author reviews the various aspects of Heaviside's study, representation and simplification, and utilization of Maxwell's theory of electromagnetic wave propagation in his successful endeavour to develop a comprehensive theory of telegraph and telephone line transmission. This paper is unusually interesting as it deals in comparative detail with the staggering amount of work which Heaviside did in the field of electromagnetism and illustrates the spontaneity of his style and his powers of deductive reasoning. A selection of extracts from his published works is also included.

Heaviside's operational calculus was then treated in a paper by Prof. Balth. Van Der Pol and was shown to be a very effective simplification of the ordinary calculus. Essentially, this comprises the use of the symbol p to indicate the operation of differentiation instead of $\frac{d}{dx}$ and $\frac{1}{p}$ to indicate integration, with the condition that p^2 signifies differentiating twice and p^3 differentiating three times. This symbol is then manipulated


PRESENTED TO THE BOROUGH OF TORQUAY
BY THE INSTITUTION OF ELECTRICAL ENGINEERS
IN MEMORY OF
OLIVER HEAVISIDE. F.R.S.
HONORARY MEMBER OF THE INSTITUTION
A MATHEMATICIAN OF GENIUS, WHOSE PIONEER
RESEARCHES IN ELECTROMAGNETIC THEORY
CONTRIBUTED GREATLY TO THE SCIENCE AND
DEVELOPMENT OF ELECTRICAL COMMUNICATIONS
BORN IN LONDON 1850
A RESIDENT OF TORQUAY FROM 1909 TO 1925
DIED IN TORQUAY 1925

From 1909 until his death in 1925 Heaviside lived at Torquay where this plaque was placed by the I.E.E. in the Town Hall some time ago

algebraically and it should be noted that in a.c. work p is equivalent to the symbol used in vector analysis.

The strong and at the same time unfair criticism which this method evoked can be traced to the unsystematic way in which Heaviside treated his problems and to his lack of mathematical rigour. His solutions to problems on the propagation of disturbances over long lines are often astounding and he derived new relations between mathematical functions which even to-day cannot be approached by classical methods. His calculus is invaluable in the study of transient phenomena as long as these obey linear equations.

Prof. Van Der Pol stresses the nature of Heaviside's achievements and draws a parallel between his life and that of the Indian mathematician Ramanujan. The second part of the paper deals with modern developments of the operational calculus, both fundamental and applied. Carson's work in justifying Heaviside's methods by the Laplace transform is emphasized and it is shown that Heaviside himself was aware of this basis to his calculus.

Many recent extensions of the operational calculus have been founded on the Laplace transform and a generalized calculus allows more mathematical functions to be covered than by Heaviside's original methods. This calculus is found to be of great use in some branches of pure mathematics including the theory of numbers.

The greatest contribution which Heaviside's work has made to electrical engineering has been in the field of long-distance telecommunication and in relation to this work Dr. W. G. Radley presented a paper reviewing fifty years' development in telephone and telegraph transmission. The paper describes the technique of loading land and sea cables with inductance and it is explained that Heaviside was the first to investigate mathematically the problem of the coaxial cable. The use of this and other types of modern transmission is referred to briefly.

Heaviside investigated the reflection of magnetic waves in heterogeneous space and suggested the possibility of a reflecting layer in the upper atmosphere. Some account is therefore given of the physics of the ionosphere together with a description of various systems which have been developed to overcome the effects of ionospheric irregularities on long-distance radio-communication. The paper concludes with a brief reference to possible future methods of transmitting information which may emerge as a result of contemporary study of the problem of long-distance communication.

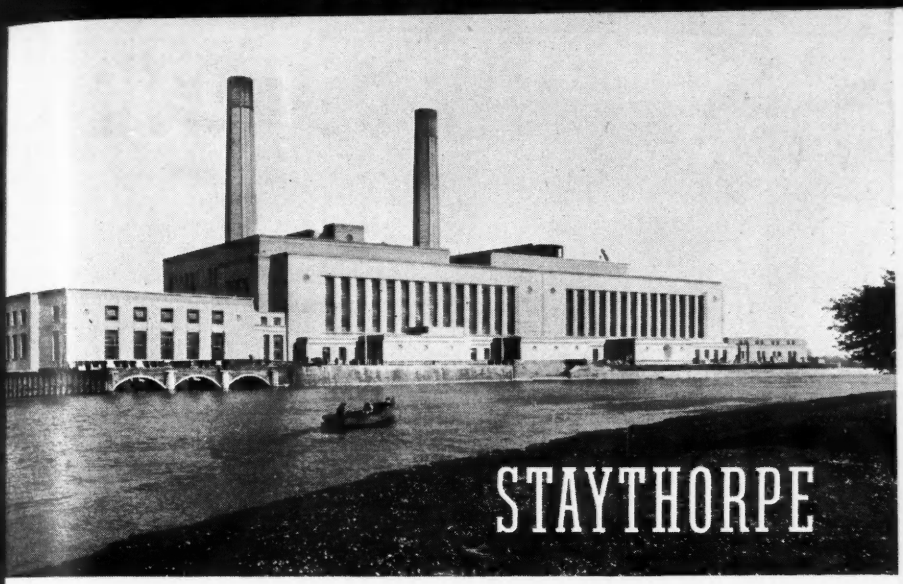
In conclusion, Mr. H. J. Josephs gave a résumé of a paper on "Some Unpublished Notes of Oliver Heaviside" which he had prepared from the Heaviside papers and documents in the possession of the Institution. Further interest was added to the occasion by the arrangement in the entrance hall of the Institution building of an exhibition of Heaviside's manuscripts, notebooks and letters. .

Gas-Turbine Electric Locomotive

Ready for Service in Western Region

AT Paddington Station last week we inspected the new gas-turbine electric locomotive No. 18,000 (see *Electrical Review*, 13th January, page 49), which will operate in the Western Region of British Railways. Since arriving in this country early in February it has undergone a series of tests over various sections of the line and we understand that it is now ready to be put into service.

The application of gas turbines to railway traction has interesting possibilities when compared with diesel and steam engines The absence of the large number of moving parts in comparison with the diesel engine, for example, should decrease maintenance considerably and give the locomotive a high availability. British Railways have always sought to keep abreast of any new developments affecting railway working and this 2,500 h.p. machine, which was built in Switzerland by Brown-Boveri & Co., in conjunction with the Swiss Locomotive and Machine Works, will enable them to gain experience with this type of power unit and to ascertain whether or not its potential advantages can be achieved.



First 60 MW Set Goes on Load

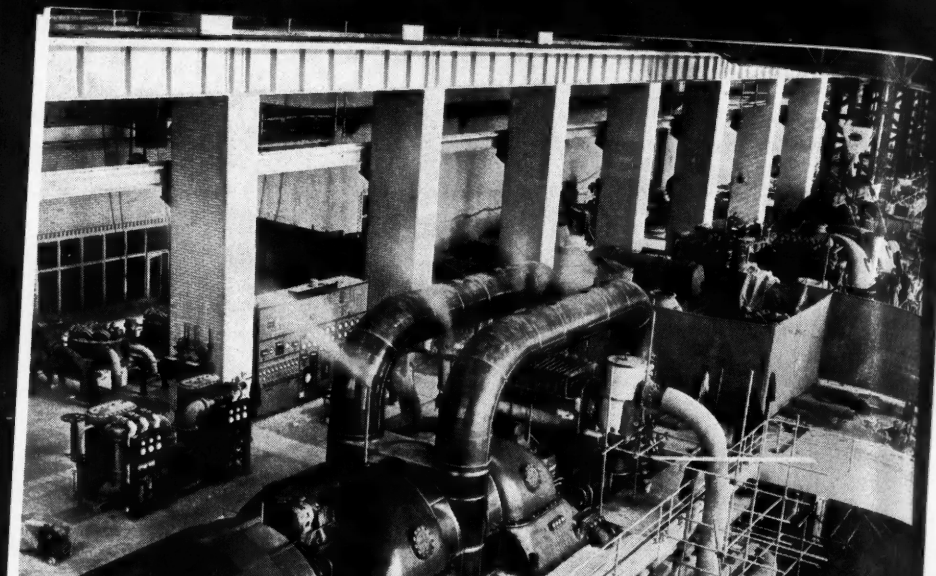
RECENTLY we visited the partially completed 360 MW Staythorpe "A" generating station, which is one of the northern group of stations in the East Midlands Division of the B.E.A. It is situated just above Averham Weir on the west bank of the River Trent, about three miles to the south of Newark, and for the purposes of a power station the site has the advantages of adequate cooling water supplies, proximity to the East Midlands coalfields, ensuring a supply of coal at a price comparing favourably with any in the country, good rail facilities and eminently suitable soil conditions. This site was originally selected by the former Derby & Notts Power Co. which intended eventually to build two similar stations, each of 360 MW capacity, the first of these now being under construction.

Although work was started on the first station in July, 1946, full-scale construction did not begin until after the floods of 1947. Good progress was then made. Aided by the production of reinforced concrete beams and blocks on site, plant erection was not unduly delayed and the first 60 MW unit was put into service during March, 1950, only a few months behind schedule. The building is steel framed, clad in sand-coloured brick, and has been designed to afford maximum operational facilities. Externally it is most impressive, yet in keeping with its natural surroundings, and it represents a notable achievement in architectural design.

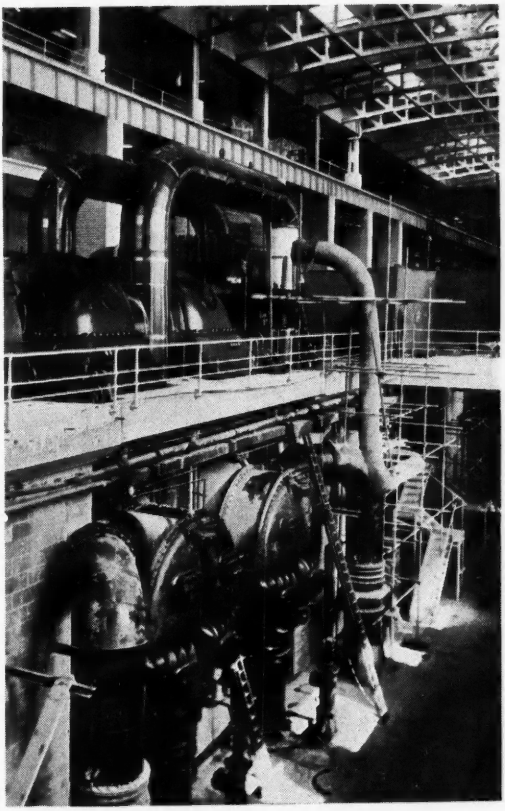
When completed the turbine room, which runs parallel to the river, will be 730ft long by 100ft wide, the three boiler houses, each 190ft long by 186ft wide, being arranged at right angles to the turbine room.

For fuel the station uses coal with a calorific value of about 10,000 B.Th.U/lb, storage space for about five or six weeks' supply being provided in a stocking yard at the rear of the boiler houses. Railborne coal is handled by wagon tipplers, from which it can be transported either to the storage dump by means of bulldozers and drag-scrapers or direct to the boiler bunkers by gravity

Staythorpe "A" is on the west bank of the River Trent about three miles south of Newark



Each set is equipped with twin condensers which have a net cooling surface of 57,000 sq ft



bucket type conveyors. Each of the boiler houses will ultimately contain six Babcock & Wilcox C.T.M. "Highhead" spreader stoker type boilers designed to have a maximum evaporative capacity of 240,000 lb/hr, steam conditions at the stop valve being 950 lb/sq in at 925 deg F. Fully automatic Bailey combustion control, Lockheed-Babcock hydraulically operated steam soot blowers and Simon coal weighers are fitted as standard equipment, other features including grit refiring, Pratt-Daniel grit collectors, induction regulator speed control on the i.d. and f.d. fans and temperature control by desuperheating. There are six coal hoppers for each boiler house, each one having a capacity of 400 tons.

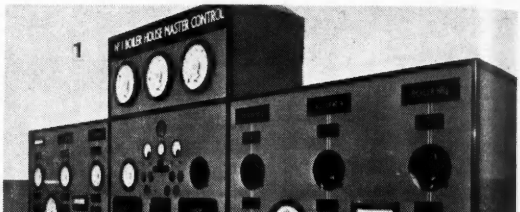
As spreader stokers are employed the ash is more readily disposed of than is residue from pulverized fuel plant, it being conveyed in tipping trucks from hoppers below the boiler houses to a dumping ground at the rear of the station where gravel has been excavated for use in the construction work.

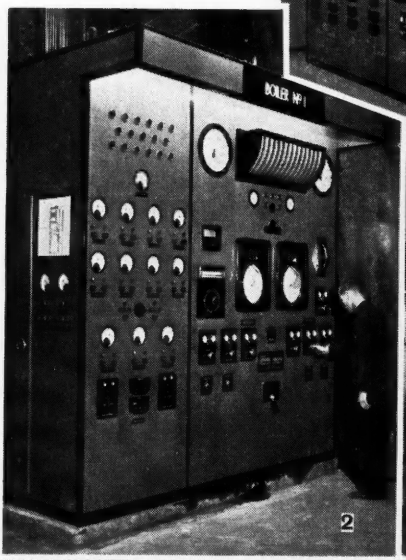
The completed turbine room will accommodate six 60,000 kW B.T.H. turbo-alternators disposed longitudinally down the length of the building. They are designed to run at 3,000 r.p.m. and to operate with steam at 900 lb/sq in and 900 deg F, exhausting to the condensers at a vacuum of 28.5 in Hg when running at maximum continuous rating with circulating water at an inlet temperature of 70 deg F.

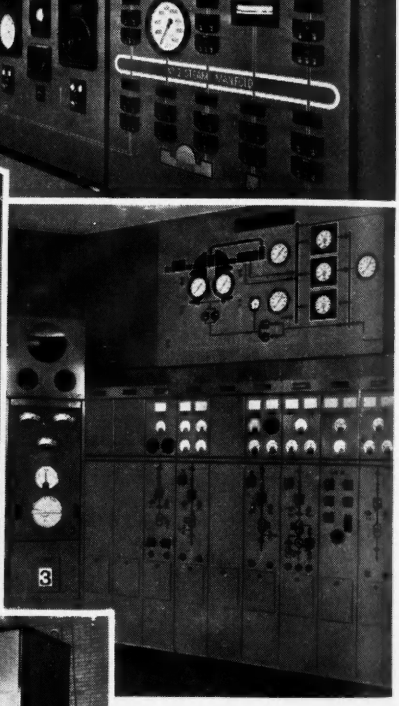
The turbines are of two-cylinder double-flow construction, having 20 stages in the h.p. cylinder and five double-flow stages in the l.p. cylinder. The alternators generate at 15 kV and have a rating of 75 MVA at 0.8 power factor; they are designed for two-shift operation, if necessary, barring gear and electrical rotor heating equipment being provided. Bled steam feed heating plant consists of one l.p. heater and three h.p. heaters per set, these raising the temperature of the feed-water to 375 deg F. The l.p. heater is of the direct-contact de-aerating type. Other features include for each unit one de-aerator and an emergency by-pass on the h.p. heaters to operate in the event of a tube failure.

The turbine room is served by a 130 ton

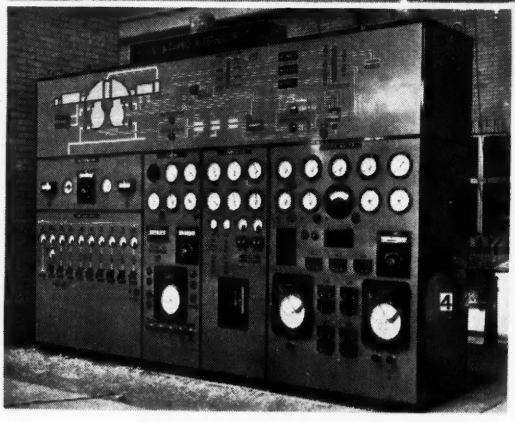
(SEE OPPOSITE PAGE) Top: General view of No. 1 set, which is now in operation. Below: Each boiler house will ultimately contain six of these B & W spreader stoker type boilers







(1) Each boiler house has its own control room where all principal steam valves are remotely controlled. (2) No. 1 boiler control panel is situated near its associated boiler



(3) Station performance indicator panels are mounted above the usual electrical panels in the control room. (4) Each turbo-alternator control panel is provided with a synchroscope

travelling crane with an auxiliary 25 ton hoist. A rail siding runs the whole length of the building and into a well-equipped workshop at the west end. In addition, a large working platform at turbine floor level is provided for installation in the condenser well alongside a turbine to give extra floor space when major overhauls are in progress.

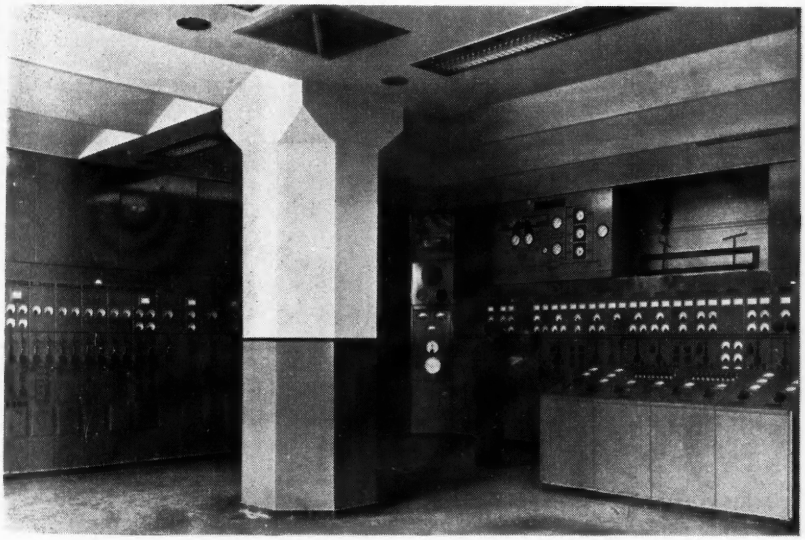
Each set is equipped with twin condensers having a net cooling surface of 57,000 sq ft and being supplied with 50,000 gallons of cooling water per minute. There are six Drysdale vertical drowned type circulating water pumps driven by variable speed a.c. motors and these are housed in a separate building, at the west end of the site on the upstream side of the station and fed into common bus mains, each serving three sets. A chlorination plant is also installed in this building to prevent condenser tube fouling. The circulating water discharge from each pair of turbines enters a drowning pit in the turbine room and leaves by a flume which runs the greater part of the station frontage, forming the river wall. If required, the outflow from this may be diverted below Averham Weir to prevent recirculation.

River water is used for make-up after "break-point" chlorination and treatment in a Paterson softening plant to remove ammonia before the water is fed into the central evaporating plant. There is one Harland electric and one Weir steam boiler feed pump for each set, each being designed to work at 1,200 lb/sq in and deliver 620,000 lb/hr.

The generated voltage throughout the station is 15 kV, this voltage being stepped up on No. 1 and No. 2 set to 66 kV and on No. 3 set to 132 kV by 75 MVA generator transformers. Each set has a 15/3.3 kV unit transformer of 5 MVA capacity and this, together with the generator transformer, is situated in a compound at the front of the station, one being provided for each set.

The 66 kV switchgear is situated in an outdoor compound adjacent to the pump house and consists of B.T.H. type O.W. single-phase units of 1,500 MVA rupturing capacity. Sets Nos. 3, 4, 5 and 6 will be switched at 132 kV in the adjoining substation, which is interconnected with the 66 kV substation by two 60 MVA, 132/66 kV transformers.

A corner of the main control room which is air conditioned and has fluorescent lighting



A point of interest is that a 275 kV transmission line is to be erected between Staythorpe and Neepsend, equipment for which is already arriving on site. It is understood that the transformers for this project will be B.T.H. 132/275 kV units of 120 MVA capacity and that the overhead line work at the Staythorpe end will be performed by British Insulated Callender's Cables, Ltd. Although it is designed for 275 kV single-circuit operation, this line will at first be worked at 132 kV.

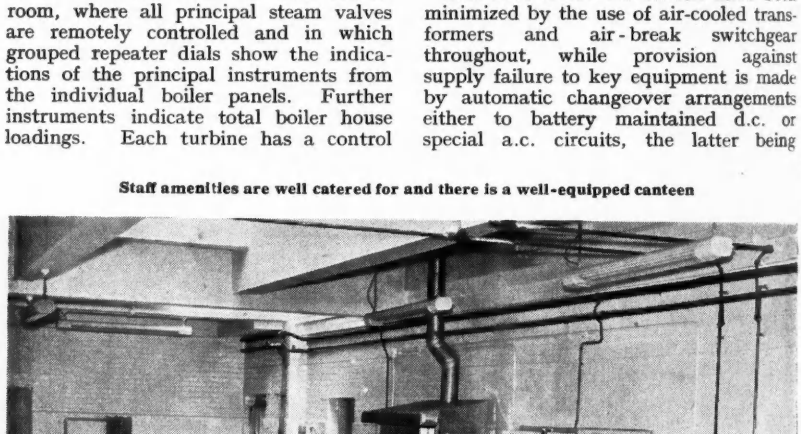
The 3.3 kV station auxiliary supply is obtained either from the unit transformers or from the 66 kV busbars via house transformers. This 3.3 kV supply forms a ring main feeding 3.3 kV/415 V transformers at various substations for l.v. auxiliaries. All motors of above 100 h.p. are supplied from the 3.3 kV system, while smaller motors operate at 415 V and all variable speed drives are effected via induction regulators.

Control has received special attention. Each boiler house has its own control room, where all principal steam valves are remotely controlled and in which grouped repeater dials show the indications of the principal instruments from the individual boiler panels. Further instruments indicate total boiler house loadings. Each turbine has a control panel mounted alongside the machine, a special feature being provision of a synchroscope so that the turbine driver can observe synchronizing conditions when the control engineer is performing the operation in the main control room.

The latter is situated at ground floor level on the river-front side of the building together with the relay rooms, battery room, telephone exchange and office accommodation. In addition to the usual electrical panels, fault annunciators, switch signals, etc., there is a "station performance indicator" where in diagrammatic form the indications from the boiler house control room, turbo-alternator control and circulating pump panels are repeated. A master panel in this room also provides for the emergency operation of all principal steam valves. The control room, which is furnished with diffused and concealed fluorescent lighting arrangements, is fully air conditioned, as are the adjoining relay and meter rooms.

Fire risks inside the station have been minimized by the use of air-cooled transformers and air-break switchgear throughout, while provision against supply failure to key equipment is made by automatic changeover arrangements either to battery maintained d.c. or special a.c. circuits, the latter being

Staff amenities are well catered for and there is a well-equipped canteen



served by two automatic starting diesel-driven 415 V alternators.

Staff amenities are also well catered for by the provision of accommodation distributed throughout the building, and, in addition, there is a very well-equipped canteen with seating arrangements for 300, service being on the cafeteria principle.

Since 1947 work on this station has proceeded continuously. The first set is already on load and No. 2 set is being erected and should be put into service during the summer. The preliminary work on Nos. 3 and 4 sets is under way and these are expected to be commissioned in 1951 and 1952 respectively. Of the three boilers associated with No. 1 set, one is completed and the other two are nearing completion. About two-thirds of the civil work has already been done, the 55 kV switchgear compound is nearing completion, but the 132 kV compound is still under construction. The main contractors and consultants are Balfour Beatty & Co., and among the principal contractors for the station equipment are Babcock & Wilcox, Ltd., steam-raising plant; British Thomson-Houston Co., Ltd., turbo-alternators, turbine auxiliary motors, 66 kV switchgear and 15/66 kV and 15/3.3 kV transformers; Ferranti, Ltd., 66/132 kV transformers; General Electric Co., Ltd., 132 kV switchgear; Drysdale & Co., Ltd., Harland Engineering Co., Ltd., and G. & J. Weir, Ltd., pumps; Worthington Simpson, Ltd., condensers; Bailey Meter Co., Ltd., turbine and boiler instrument and control panels; Lancashire Dynamo & Crypto, Ltd., and Laurence, Scott & Electromotors, Ltd., motors; Alton Batteries, Ltd., Chloride Electrical Storage Co., Ltd., and Pritchett & Gold, Ltd., batteries.

NEW BOOKS

Alternating-Current Motor Windings. By H. Hopwood. Pp. 320; figs. 201; index. George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2. Price 25s.

Various textbooks have been written on the design of electrical machines which have been mainly concerned with the calculation of core sizes, number of conductors and mechanical details, but this book deals principally with the more practical side of motor windings. The author has had many years of experience of armature winding and is well qualified to deal with such matters.

There is a useful chapter on the characteristics and operation of a.c. motors, including motor - convertors and the Schrage commutator machine, and a chapter in which are discussed the various types of alternating current windings, with useful tables of coil groupings. Separate sections are devoted to the winding of fractional horse-power motors, low voltage windings, and also the arrangement and insulation of high voltage windings. Of particular interest to the winder and machine designer are the details which have been given for calculating the dimensions of formers used in coil manufacture and for calculating the size and number of steel retaining bands.

The text is easy to follow and is very well illustrated; there is also a detailed index. The book contains much useful information for all concerned with winding matters, whether in the design office or the works, and can also be recommended to students of electrical engineering who are interested in this subject. It must, however, be emphasized that the book is concerned with the practical aspects of motor windings and does not deal with the design of machines or calculation of coil turns.—J. L. W.

Electronics: Experimental Techniques. By W. C. Elmore and M. L. Sands. Pp. 417, figs and index. McGraw-Hill Publishing Co., Ltd., Aldwych House, Aldwych, London, W.C.2. Price 32s in U.K.

This book is Volume I of the National Nuclear Energy Series, a record of some of the work of the Manhattan Project Technical Section. It contains a description of the electronic art in so far as it applied to the instrumentation of the project; the material in the book includes circuit components and construction practice, amplifiers, counters, oscillographs, test equipment, power supplies and control circuits.

Thus elementary and semi-design information is given for a high voltage supply for a Geiger-Müller counter and for a cathode-ray tube. The work should appeal to those for whom the volume "Waveforms" in the M.I.T. Radiation Laboratory series is too advanced. A brief account is given of Professor Elmore's treatment of the transient response of wideband amplifiers: this is an improvement over previous work, and deserves to be widely known. The book is recommended to those who are not familiar with electronics, and should serve as a good introduction.—A. T. S.

Electrical Engineers' Handbook: Electric Power. Fourth Edition. Edited by H. Pender and W. A. Del Mar. Chapman & Hall, Ltd., 37, Essex St., London, W.C.2. Price 68s.

Major developments since 1936, when the last edition of this handbook was published, have justified the considerable alterations made in the new volume. Thus, system stability and the theory of symmetrical components are now treated at length and applications such as radio-frequency heating (termed "dielectric heating"), servo-mechanisms, permanent magnets and plastic insulations receive the attention due to their growing importance.

The scope of the work is not restricted to purely electrical subjects. In addition to a section on power stations (steam and hydro), which includes dissertations on heat economics, there is a good deal of information on diesel engines. The latter exemplifies a tendency of the book to concentrate on established practice in the United States rather than on potentialities, reference to gas turbines being only to their present experimental state. On the other hand, we are unable to trace any account of diesel-electric traction, especially for shunting, although its application to marine propulsion is covered. The same tendency appears in the prominence given to rotary convertors and even motor-generators compared with mercury-arc rectifiers, which are still assumed to require pumps.

A further illustration is provided by the cursory treatment of d.c. for high-voltage transmission, although, as regards distribution, it is strange to British readers to read that direct current is "generally used in congested city districts because of the greater ease with which good voltage regulation is maintained." Primary distribution at voltages of up to 34.5 and sometimes 60 kV is more completely covered in the handbook than transmission at very high voltages with its associated equipment.

Generally the varied applications of electricity receive adequate treatment, although in a work of this comprehensive character, to which seventy-five authors have contributed, some unevenness in the merits of the nineteen well-defined sections is inevitable. Nevertheless, the book as a whole adequately sustains the standard set by the original edition in 1914.—C. O. B.

Books Received

Workshop Engineering Calculations and Technical Science. Vol. 2. By J. Stoney. Pp. 212; figs. 177; index. English Universities Press, Ltd., St. Paul's House, Warwick Square, London, E.C.4. Price 12s 6d.

Application of the Electronic Valve in Radio Receivers and Amplifiers. Book IV. By B. G. Dammers, J. Haantjes, J. Otte, H. v. Suchtelen. Pp. 416; figs. 256; index. Cleaver Hume Press. Price 35s.

Basic Electronics. By R. G. Kloeffler and M. W. Horrell. Pp. 435; figs. and index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 40s in U.K.

Communications Circuits. By L. A. Ware and H. R. Reed. Pp. 403; figs. and index. Chapman & Hall, Ltd. Price 40s in U.K.

Questions and Answers on Electric Arc Welding. By E. Crawford. Pp. 112; figs. 62; index. George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2. Price 5s.

Co-operative Industrial Research. By Ronald S. Edwards. Pp. 285; index. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2. Price 20s.

Short-Wave Radio and the Ionosphere. By T. W. Bennington. Pp. 138; figs. 57; index. Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 10s 6d.

ELECTRICAL CONTRACTING: Organization and Routine

By H. R. TAUNTON, A.M.I.E.E.

4—*Advertising*

MORE must be said about advertising as a means of obtaining orders. It is to-day an essential in any trade. He who shouts loudest, shouts last: he survives when his competitors who have clung to the dignified silence of their grandfathers are silent in bankruptcy. His wares will not sell themselves. Considered as luxuries, the public has to be educated to the point of wanting them. Considered as necessities, it has to be induced to favour those of the particular advertiser, even as it favours special brands of other necessities.

As was pointed out in the preceding article, the contractor who wants to make an individual appeal is handicapped by the fact that ordinarily he has nothing to offer the public which his competitors cannot claim also to have. He has no special talking point. It is the more essential, therefore, that the advertising he must do shall be done with the utmost efficiency within the limits of what he can afford to spend on it.

This is not the place for a dissertation on the technique of preparing Press displays. Numerous handbooks are available, and any contractor about to spend money on advertising should buy a manual which will teach him how to advertise. The art is not to be learnt by intuition. Here, however, are a few elementary pointers:—

Catching the Eye

Before drafting your copy, study a few issues of the paper in which it is to appear. Observe the types, the borders, and the general layout of the various displays; and then make it your object to achieve something different, something that will stand out by its very difference. That is the keynote of effective advertising: first, to catch the eye, and then, having caught it, to hold it.

An illustration is of the utmost value. A good block may give at a glance as much information as half a column of letterpress, and it makes no demands on the concentration of the cursory reader. Special blocks may be expensive, but electros illustrating apparatus can usually be obtained without cost from the manufacturers.

Avoid the common mistake of making your name the prominent feature of a display. "Smith, Jones & Co." means nothing to a potential customer who may be looking for "Electrical Contractors." On the other hand, it is no use remaining to him just an anonymous contractor. He may not at the moment want anything electrical, but when he does, your name is the one that should be associated with it. That is the bedrock principle of regular advertisement: to promote a natural association of ideas in the mind of the public between the advertised commodity and the advertiser of it.

Concentration Advantageous

Having caught the eye, do not irritate or weary it. Do not try to make too many points: if you are advertising specialities, concentrate on one at a time. Avoid crowding your space with reading matter; do not be diffuse or prosy.

Purchasers are interested in prices. You want to reassure at once the man who would really like to have it—say, an electric kettle—but will dismiss it from his mind as something more than he can afford, unless you can tell him the contrary. Try to embody in your advertisement some little item of information. That will always interest the average man, and it will be appreciated—it is something gratuitous.

Change your matter frequently. A display three or four times repeated loses any appeal it may have had at its first appearance. And, finally, do not mix your types. Better two or three sizes of a good plain type than half a dozen of the "ornamental" types beloved of the cheap printer. Never set up whole sentences in capitals: they are far more

wearisome to read than the familiar "lower case."

Having decided to allocate a limited sum to Press advertising, it is better to spread it over as long a period as possible, provided it will command an adequate space at regular intervals, rather than to spend it all on one or two ambitious displays followed by a long silence. You are more likely to attract the friendly attention of a man by repeatedly tapping him on the shoulder than by thumping him on the back and running away.

Postal Publicity

The next obvious form of publicity open to the contractor is postal publicity: form letters, leaflets, folders, pamphlets, and booklets. Except as a means of sounding prospects in a newly developed area, or perhaps as a cover to a leaflet illustrating some speciality, form letters are of little use to a contractor. If circumstances warrant their use at all, the greatest pains should be taken with them. They must be on really good paper, if the firm's standard stationery is not already as good as it should be; and a little care should be taken to give them the appearance of being an individual communication—a matter of matching the addressee's name with the body of the letter. He is subconsciously flattered by the attempt, although he may rarely be deceived by it.

Of leaflets and folders little need be said. Their application is chiefly to the selling of specialities, such as lamps and domestic devices and the needs of most contractors are amply filled by the "literature" obtainable from manufacturers for overprinting. It is rarely worth a firm's while making up a special folder of its own, unless it be a short list of contracts carried out or, say, an offer of maintenance. This type of matter is best distributed as enclosures in current correspondence.

Pamphlets and booklets—technically a pamphlet is a booklet of less than six pages—are not so easily obtainable from manufacturers; or, if they are, it is only in limited quantities. Their distribution is therefore limited to selected cases, where they are most likely to bring results. To those firms who can afford it, a booklet recording their activities past and present, or illustrating some such speciality as hospital or theatre installations, will be found a valuable form of propaganda, particularly in backing up a quotation; but a booklet of this kind is worthless if it is not well printed, well illustrated, and generally well got-up, preferably by an expert. It must be attractive, readable, and convincing, if it is to do its work before it is thrown away; and any shoddiness of appearance will inevitably damn it.

Very few who are solely contractors have need of, or, in fact, can afford, a publicity department of their own. Usually their modest advertising is entrusted to some member of the firm who has—or is supposed to have—a flair for it. If a firm, however, contemplates a considerable expenditure on publicity in any form, it will be penny-wise if it leaves it in the hands of an amateur, to save the few pounds of an expert's fee.

Posters are of no use to electrical contractors. Placards—permanent posters—may sometimes be so in certain positions, as a means of keeping a particular name and address before a likely public. This purpose is well served by the signboard which most firms employ to announce the fact that they are carrying out work in the building to which it is affixed. The contractor should aim, in designing his signboard, to make it distinctive in arrangement and colour, so that it stands out from the many others which will probably be decorating the same building.

Labelling of Equipment

Another simple form of publicity often neglected through sheer carelessness is the adequate labelling of the gear in a completed installation. Unless the contractor is ashamed of his work, he should surely be glad of a chance to tell the world who did it, and where they may apply for more of the kind. No job should be left until the supervisor has satisfied himself that at least all the main switches and fuseboards bear his firm's name and address.

To those contractors who run a shop, the window display is obviously one of their most important publicity media. Some of the principles stated in respect of Press display apply equally to window display. Do not distract the eye by overcrowding or gaudy trimmings—you are

not selling drapery—or by glaring lights. The simpler and more concentrated the scheme of window dressing, the more likely it is to halt the possible buyer.

What applies to the window applies largely to the interior of the shop or showroom, except that the object is now to offer the visitor as wide a choice as possible. But that object will still be defeated by a jumble, without skilful grouping and adequate spacing; and by the indifferent, ignorant "salesmanship" all too common in contractors' showrooms—but that is another story.

With the exception of such trifles as calendars and petty advertising novelties, we have now exhausted the possibilities of direct advertising by the individual contractor. But there are open to him other forms of advertising not less valuable because they are indirect and intangible. The general appearance of the firm's business quarters, its furnishing and its stationery, all have a psychological effect, for or against, on possible customers. So, too, has the character and demeanour of its staff, especially the foremen and electricians. Men who are careful and clean in their work, and also good-natured and obliging, are a definite advertising asset to their firm, which is given the credit of their virtues.

Collective Advertising

So much for the advertising methods available to the individual, competing with his fellows for the possible customers in a limited field. There is, however, a wider form of advertising open to him as one of the general body of contractors: collective advertising. It has not the handicap imposed on him of lack of talking points. It has at command facts and arguments unlimited to point the superiority of electricity as an illuminant and its advantages for power over gas and steam, educating the public to look upon electricity as a necessity; all to the benefit of the industry as a whole, and of the contractor as a member of it. He should adequately support the movement.

The Electrical Development Association is the leader in it, assisted in narrower fields by organizations such as the Electrical Contractors' Association and the National Register of Electrical Installation Contractors.

Finally, what constitutes a reasonable allocation to cover the year's publicity? In any trade that is a very moot point. The advertising enthusiast will talk of "casting bread upon the waters," and throw the whole bakery overboard—and probably soon be very hungry. The sceptic will grudgingly scatter a few crumbs which will sink unnoticed by the most desirable fish. The difficulty in the contracting trade is to find a common-sense medium.

However little it may seem to him he can afford it, the contractor must make up his mind to some expenditure on advertising. Various factors peculiar to the trade make wide and expensive publicity unnecessary to him, in fact, difficult, as has already been pointed out.

Extent of Allocation

So it is that when we try to get down to figures, we find a dearth of data, and what there is, vague and conflicting.

It is a question only to be decided by individual experience. The wise procedure is to allocate a conservative amount not to be exceeded in the course of a year—it would be difficult to determine in less time how far its expenditure has been justified. Every effort should then be made to trace inquiries and orders to their publicity sources by "keying" Press advertisements, or by the enclosure of reply-paid postcards with mailed matter.

There will be a certain number of orders which cannot be so traced but for which no other origins can be determined, and it will be reasonable to assume that a proportion of them is indirectly to be credited to the expenditure on publicity; of which, on the debit side, should be kept a careful account. It will include not only payments for space and for the printing of literature, but all such items as experts' fees, artists' work, photographs, blocks, stationery and special clerical work, postages and other incidental expenditure.

By a comparison between the profit on the orders traceable and assumed to be traceable to publicity and the total cost of it as thus ascertained, the firm will be able to decide how far the original allocation was a reasonable one, or whether it should be reduced or increased in the ensuing year.

Canadian Electrical Imports

Increase of 12 *per cent in* 1949

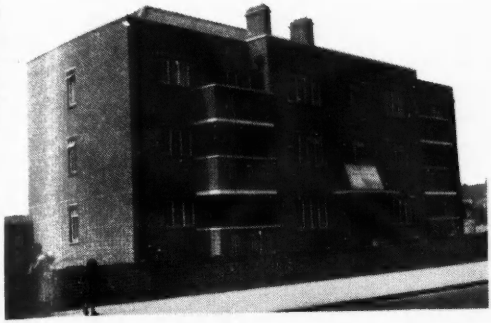
THE Canadian Government has issued preliminary figures of import trade last year. That in electrical goods totalled $69,802,000 in value, an increase of about 12 per cent on 1948. Some of the leading items for 1949 are shown in the accompanying table with notes of increases or decreases compared with the preceding year. It will be seen that there were larger purchases from the United Kingdom of motors over $10 in value, transformers, telegraph and telephone apparatus and a few other goods. At the same time imports of transformers and of generators from the United States of a kind not made in Canada rose in value. In the latter the United Kingdom seems to have lost ground last year and her position in the import of flame-proof switchgear appears to have weakened also.

Canadian electrical exports declined in value last year from $16,822,000 to $12,293,000.

Class of Goods	1949 $(000)	Inc. or dec. $(000)
Batteries, flashlight and parts	44*	− 19
Batteries, hearing aid and parts	197*	†
Batteries, primary, n.o.p. ...	153*	†
Batteries, storage	933	+ 291
From United Kingdom ...	74	+ 16
„ *United States*	859	+ 275
Heating apparatus	496	+ 10
From United Kingdom ...	2	− 10
„ *United States*	493	+ 19
Dynamos and parts	3,439	− 685
From United Kingdom ...	256	− 309
„ *United States*	3,167	− 364
„ *Switzerland*	2	− 1
„ *Australia*	2	− 2
Torchlights, flashlights, side and tail lights	458	− 249
From United Kingdom ...	63	+ 15
„ *United States*	391	− 250
Lighting fixtures and appliances	3,030	+ 339
From United Kingdom ...	55	+ 23
„ *United States*	2,713	+ 235
Electric meters	983	+ 37
From United Kingdom ...	101	− 51
„ *United States*	840	+ 147
Motors valued at less than $10	430	+ 181
From United Kingdom ...	16	+ 11
„ *United States*	413	+ 181
Motors, other, and complete parts	8,154	+ 170
From United Kingdom ...	960	+ 359
„ *United States*	7,123	− 173
Rheostats, controllers, etc. ...	5,433	+1,466
From United Kingdom ...	130	− 8
„ *United States*	5,264	+1,478
„ *Switzerland*	39	− 2
Electric irons	193	+ 8
From United Kingdom ...	69	+ 25
„ *United States*	123	− 18
Sockets, outlets, etc.	537*	− 148
Transformers and parts ...	1,853	+ 489
From United Kingdom ...	552	+ 227
„ *United States*	1,261	+ 277
„ *Switzerland*	39	− 15
Switchgear for use in coal mines	263	+ 205
From United Kingdom ...	148	+ 90
„ *United States*	115	+ 115
Switches, switchboards, etc. ...	4,826	− 30
From United Kingdom ...	247	− 168
„ *United States*	4,431	+ 241
„ *Switzerland*	148	− 103
Telegraph apparatus	1,733	+ 72
From United Kingdom ...	224	+ 178
„ *United States*	1,508	− 99
Radio valves	1,309	+ 597
Sets and other radio apparatus, n.o.p.	11,092	+3,586
From United Kingdom ...	375	− 403
„ *United States*	10,701	+2,985
Telephone apparatus	6,123	− 126
From United Kingdom ...	1,473	+ 399
„ *United States*	4,650	− 510
Electric steam generators and parts, of a kind not made in Canada	3,846	+1,075
From United Kingdom ...	499	−1,022
„ *United States*	3,339	+2,253
Electric dry shavers	787	+ 412
From United States	672	+ 297
„ *United Kingdom* ...	92	+ 92
Electric precision instruments	1,666	+ 221
From United Kingdom ...	114	+ 32
„ *United States*	1,546	+ 192
Electrical apparatus n.o.p. ...	7,991	+ 892
From United Kingdom ...	230	− 133
„ *United States*	7,741	+1,063

* All or nearly all from U.S.A.

† Comparative figures not available.



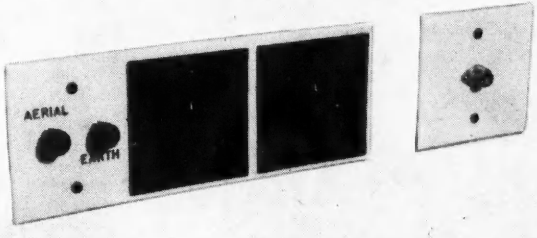
Installations in Flats

Up-to-date Equipment at East Ham

A GOOD example of modern domestic wiring practice is to be seen in the two blocks of six three-bedroomed flats which have just been built in High Street North, East Ham, for the East Ham Corporation.

The electrical installations are carried out in ¾in screwed steel conduit, the lighting circuits being wired in 3/0.029 v.i.r. and the heating circuits in 7/0.029 v.i.r. In each flat there are eleven lighting points and eleven 13A shuttered socket outlets, to B.S.1363, the complete installation being controlled through a standard E.D.A. consumers' control unit situated in a cupboard in the kitchen. Ten of the heating points are wired on the ring-main system and the remaining point, for the wash boiler in the kitchen, is wired separately. There are also two other separate circuits in the kitchen, one for the cooker and the other for a 20-gallon U.D.B. boiler, which supplies hot water to the bathroom, etc.

One feature of the installation is the provision in the living room of two aerial and earth terminals, together with mains socket outlets for radio receivers and also a television aerial and earth and mains outlet. Thus the provision of an efficient aerial system for all the tenants avoids the possibility of the roof becoming fes-



Top of page: One of the blocks of six three-bedroom flats built for East Ham Corporation

Above right: Corner of the kitchen showing the cooker and 20-gallon U.D.B. boiler for the hot water supply

Right: Television and radio aerial terminals are provided in each flat together with mains socket outlets

tooned with television and other aerials of various shapes and sizes.

Other facilities in the flats comprise an airing cupboard incorporating a 120 W tubular heater and, in the first and second-floor flats, a drying room which communicates with the kitchen and contains a 1 kW heater.

On the ground at the rear of the flats each tenant is provided with a brick-built pram-shed, there being one bulkhead lighting fitting wired in "Pyrotenax" mineral-insulated metal-clad cable for each block of three sheds. These lights, together with the staircase lighting arrangements, operated by a time switch, are metered separately and not paid for by the tenants.

The flats have been built by S. Newlyn & Son, Ltd., under the direction of the Council's chief housing officer, Mr. J. E. Austin, M.B.E., F.I.S.A., the electrical installations having been carried out by L. Power & Son, of Ilford, in conjunction with Mr. R. F. Kenchatt, electrical assistant to the chief housing inspector.

Bombay Electrical Contractors

TO mark the completion of twenty-five years' existence the Electrical Contractors' Association, Bombay, has published a silver jubilee souvenir dealing with the Association's history and containing a number of articles on various electrical subjects.

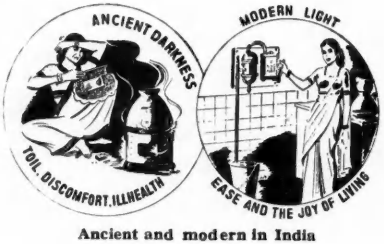
In September, 1924, the Government of Bombay announced its intention of registering all electrical contractors and wiremen to improve conditions in the installation trade. This created some concern among the contractors. It is stated that "those were the days when anybody who could wield a pair of pliers and use a screwdriver became a wiring contractor, but all these workers in the electrical contracting trade came together on the issue raised by the Government and decided to form themselves into a well-knit organization whose aim was to adopt standards of high business morality and skilled workmanship in the pursuance of their activities."

The Association was formed in the early part of 1925 under the presidency of Mr. K. S. Gazder who was later appointed by the Government to represent the contractors on the Licensing Board and also became a member of the Board of Examiners.

Upon representation by the E.C.A. the Government agreed to exempt from examination those contractors and wiremen with a minimum of five years' experience of electrical contracting. Exemptions were granted upon the recommendation of the Association.

Among the articles appearing in the publication are "Nationalization *versus* Private Enterprise," by R. P. Iyer—a study of the Government of India's policy in the matter of electricity supply; "What Rural Electrification Schemes can Achieve," by K. C. Desai; the Bombay grid plan; the Ahmedabad power station; and the electrical contractor and the State. The last article airs a number of grievances including the calculation of prices by the Government and the encouragement of undercutting which results; the selection of electrical contractors; the demanding of heavy deposits; the lack of Government assistance in the obtaining of materials; the practice of allowing main contractors to present electrical tenders and make payments for contracts; and the non-recognition of the contractors of one province by other provinces.

We reproduce from one of the advertisements in the publication two pictures which delightfully portray the coming together of east and west.



Ancient and modern in India

Development in Equatorial Africa

THE 10,000 kW hydro-electric plant which is to be constructed to electrify the Brazzaville area in French Equatorial Africa may later be increased to 30,000 kW. The work will take four years. The ultimate supply of power to the Belgian Congo is already the subject of negotiations. The Energie Electrique d'A.E.F. will not limit its activity to this plant, but is already studying the electrification of Fort-Lamy and is preparing an electrification project for Dolisie, in the Middle Congo. Electrification of the Congo will be studied later.

Royal Society Conversazione

Exhibits of Electrical Interest

On 11th May, the Royal Society held its annual conversazione at Burlington House, London, the guests being received by the president, Sir Robert Robinson. The customary exhibition was arranged showing how scientists in diverse fields of activity are employing the experimental method to gain more and more knowledge of nature, and several of the demonstrations were of electrical interest.

When a magnetic field is applied at right angles to the direction of current flow in a crystal a voltage is set up. This is known as the Hall effect and its magnitude and sign were demonstrated by Mr. D. A. Wright (G.E.C.) with germanium samples of different degrees of purity. It was also shown that with sufficiently pure samples, this effect can be demonstrated with simple portable apparatus. An interesting application of the effect, however, is in the measurement of magnetic field strength and in this connection small samples were on view which provided a useful method of exploring the uniformity of magnetic fields.

Improved Magnets

The Permanent Magnet Association displayed a selection of modern permanent magnets group according to their applications and together with graphs of their characteristics. Current research was illustrated by Alcomax magnets having a columnar crystal formation along a preferred axis, giving high magnetic energy values when tested along this axis. These magnets were sectioned to illustrate the striking difference in their crystal grain structure as compared with magnets having a random crystal grain structure.

An impressive demonstration given by Prof. G. F. Hull, jnr., Wilder Laboratory, U.S.A., showed how the development of generators for electromagnetic waves of a few centimetres wavelength has made it possible to demonstrate with microwaves the phenomena of geometrical and physical optics such as reflection, refraction, diffraction interference and polarization. In most cases the microwave and optical analogues are very close or identical, while in a few cases they are not, because of the long length of microwaves. This imposes conditions on microwave optical apparatus entirely different from light. For example, synthetic dielectrics can be made for microwaves which are different from those in the visible light region. A number of these were demonstrated, some being based on the properties of electromagnetic waves reflected between conducting sheets and others on the microwave analogue of molecular arrays.

Light Speed Measurement

The velocity of light is a widely used constant and Dr. L. Essen (N.P.L.) showed how it can be measured with a cavity resonator. The equipment demonstrated has enabled the limits of error in the determination of this constant to be reduced to ± 3 km/sec. It differs appreciably from the classical value of 299,776 km/sec, but is in close agreement with a recent optical determination by Bergstrand who gives a value of 299,792.7 km/sec.

In the field of instrumentation, a galvanometer was shown by the Biophysics Unit, University College, London, which has been developed to measure very small potentials in low resistance circuits, such as occur in biological research. In this apparatus the deflection of a 25 ohm spot galvanometer is associated with two photocells which are connected to a specially stabilized d.c. amplifier, the output being indicated on a standard microammeter. The equipment is portable and readings are reliable to 4×10^{-11} A or 2×10^{-9} V in a 50 ohm circuit. With a single thermocouple, this corresponds to 5×10^{-5} deg C.

Fluorescent lamps give optimum luminous efficiency at an ambient air temperature of about 20 deg C, but at temperatures around 0 deg C the mercury

vapour pressure is materially reduced and with it the light output. At lower temperatures the mercury spectrum disappears and is replaced by that of the rare gas filling; practically no fluorescent light is emitted. Mr. E. E. Miles (G.E.C.) demonstrated this by cooling part of the lamp in a large block of solid CO_2. If the gas filling is argon, the final colour is purplish, but in the case of neon, red is obtained.

Some new phosphors responsive to 2537Å radiation were shown by Messrs. J. N. Bowtell, H. G. Jenkins and A. H. McKeag (all of G.E.C.) to be of great practical importance for fluorescent lamps. These phosphors are of alkaline earth halo-phosphate composition and are activated by antimony and manganese. Apart from their high luminous efficiency they enable, for the first time, white light suitable for general lighting purposes to be obtained from a single fluorescent material. A number of other phosphors responsive to 3650 Å radiation were shown including a zinc phosphorus which gives a white colour suitable for television screens.

The techniques of exciting the green auroral line at 5577 Å in low-pressure oxygen are now well established, Vergard having shown that if a solid nitrogen-argon mixture containing oxygen is bombarded with cathode rays, the line appears with a continuum in the region of 5,600-5,400 Å, which occurs as a phosphorescent band. A demonstration by the above-mentioned G.E.C. representatives showed that the line and the associated afterglow can now be obtained in the nitrogen-argon filling of an ordinary tungsten filament lamp excited with the Tesla discharge, maximum discharge occurring when the oxygen concentration in the filling is about one part in a million.

A portable instrument for the detection of traces of halogen vapours in the air was shown by the British Thomson-Houston Co., Ltd., to have many industrial applications. Its operation is based on the increase in positive ion formation at a heated platinum surface when the halogen concentration in the surrounding air increases. The flexibility of the device was illustrated by the demonstrations and these included the detection of 0.001 per cent trichlorethylene in mineral oil and minute leakage from pipe joints, etc.

Recent studies of explosives have shown that initiation is essentially thermal in origin, the reaction first proceeding as a slow burning and then suddenly transforming into a faster propagation or detonation. To investigate the initiation and growth of reaction fast photographic techniques have been used and a method has been developed by the Department of Physical Chemistry, Cambridge, which can show detail occurring in 10^{-8} to 10^{-9} of a second. An image convertor tube has been used to take photographs of the same general form as those obtained from drum cameras, the display of the event having been achieved by electronic deflection of the electron stream. The method is claimed to give better resolution, higher useful intensity and writing speeds a hundred times faster than have been obtained with drum or mirror cameras.

Lisburn Street Lighting Scheme

THE formal switching on by the chairman of the Lisburn Urban District Council (Mr. A. N. Stephenson, J.P.) on 3rd May marked both the inauguration of what is claimed to be the largest fluorescent street lighting scheme yet undertaken in the British Isles, and the first installation of "Rythmatic" ripple control equipment in Northern Ireland. This combination has ensured that Lisburn possesses the most advanced equipment obtainable at the present stage of development.

The Lisburn installation embraces 170 lanterns each comprising three 80W fluorescent lamps, together with nearly 400 Class B lighting lanterns and standards. The lamps and standards were supplied by Siemens Electric Lamps & Supplies, Ltd., and the "Rythmatic" ripple control equipment was manufactured and installed by Automatic Telephone & Electric Co., Ltd. Entire control is from the Castle Street substation which serves a total of 32 substations in the area. The equipment at Castle Street provides for eight different signals of which three are used for street lighting and the others may be used subsequently for such facilities as water heating, load shedding, control of shop window lighting, etc.

Industry and the House

A Debate on Science

By F. J. ERROLL, M.A., A.M.I.E.E., M.P.

ALTHOUGH this Parliament is considered to be in a state of a stalemate, and much is being said about its ineffectiveness, the debates are more varied and result in searching inquiries into different aspects of the nation's affairs. The country needed a rest from fresh legislation, and the Parliamentary time so freed has been put to good use by both sides of the House. While the Government decides on the general business in the House, the Opposition can initiate debates on what are called Supply days, and by opposing certain orders, such as the one to increase rail freight charges, can secure an effective debate on a controversial issue.

Industrial Research

A new feature of this Parliament is the revival, after twelve years, of Private Members' motions on Fridays. Each Wednesday afternoon there is a ballot at the end of questions. The first person to be successful was Mr. Phillips Price, Socialist M.P. for West Gloucestershire, who is chairman of the Parliamentary and Scientific Committee. Not surprisingly, therefore, he chose as his subject the greater utilization by industry of the scientific resources of the nation in the development of our commerce and Colonies.

The debate was not controversial and illustrated the wide measure of agreement between the parties on making the most of what we have got. Many speakers stressed that more scientists were required, and urged the provision of facilities for technical training. At one time the debate seemed wholly devoted to technical education. Mrs. Eirene White, the new Socialist M.P. for E. Flint, wanted the Government to foster the development of the social sciences; others condemned the "backward" firms who refused to take advantage of new processes and scientific techniques. Mr. Fort, the Conservative M.P. for Clitheroe, spoke in praise of research associations formed by private enterprise for the benefit of their members and industry generally.

Naturally some difference of emphasis was to be expected. Sir Ronald Cross, speaking from the Opposition front bench, showed that economic conditions must be right if "inventiveness," which is but another name for the utilization of scientific resources, is to flourish. There must be adequate rewards for the successful, or no one would take the trouble to invent. Heavy taxation was to-day a real handicap to the small inventor. Many firms, despite the reliefs given in successive Finance Acts, were not able to pay for research and development on the scale they would have liked.

Mr. Herbert Morrison, when he came to wind up the debate, admitted the need for incentives but expressed the belief that true scientists considered the value of their work and not just the money rewards. The Government had agreed in principle to the setting up of a Science Centre in London, which would house the Department of Scientific and Industrial Research, the Agricultural Research Council and the Medical Research Council in one building or a group of buildings.

Trade with Canada

A debate on Anglo-Canadian trade provided Mr. Oliver Lyttelton with an opportunity of criticizing the Government for alleged breach of faith with Canada over food and pulp and paper contracts. He also referred pointedly to the harm done by Ministerial statements about the "bad state" of British industry, and wished that the President of the Board of Trade and other Ministers would "sometimes refer to other things, like our leading position in the rayon and acetate silk industry, our lead in gas turbines, our lead in the efficient production

of chemicals and our radar record, and sometimes to proclaim the fact that we can lick anybody for quality and costs on a whole range of engineering products specially built for the job—'custom built' is the American term. Whenever opportunity offers, the opposite lesson is rubbed in, and the whole apparatus of threats, working parties, development councils, too much price maintenance and high profits, is the almost daily dirge."

Mr. Harold Wilson, in a comprehensive review, defended his record by saying that in 76 speeches he had made in Canada he had never once referred to the "grim days before the war." The export of motor cars had been spectacular, from 584 in 1938, to 15,000 in 1948, and 31,000 in 1949. One of the biggest difficulties was the "different standards of the electrical engineering industry. As a result of special discussions last year, arrangements have been made for speeding up the procedure for getting the necessary approvals for our electrical products in the Canadian market. Until that was done a great flood of possible exports was being held back."

Good progress was also being made in other branches of engineering. Large and important contracts had been secured for television equipment for the first two transmitting stations of the Canadian Broadcasting Corporation, for mechanical handling equipment, telecommunications and heavy electrical equipment. He realized that much depended on the individual Canadian engineer, who because of his training had automatically looked more to the U.S.A. than to Britain for his supplies. As a result of his visit, Canadian engineering faculties were hoping to send over a large and representative team of professors and deans to follow up these questions with British industry and technical institutions, because "looking to the future, there is no more important development in our Anglo-Canadian trade than the possible development of engineering."

The Electricity Compensation Regulations were agreed to without a division on 9th May. In addition to a useful discussion on certain points of detail the Opposition made much play of the lump-sum tax-free payments being proposed for certain individuals.

PARLIAMENTARY NEWS

From Our Special Reporter

IN the House of Lords on 9th May Lord Lucas, Parliamentary Secretary, Minister of Transport, moved the second reading of the Public Utilities Street Works Bill. He said that its purpose was to lay down a uniform code of procedure to regulate the breaking-up of streets by statutory authorities and to regulate the relations between highway authorities and those responsible for essential services such as gas, electricity, water, etc.

After some debate in which the adequacy of the penalties provided for infringement of the regulations was questioned, the Bill was read a second time.

Submarine Propulsion

During a debate in the House of Lords last week on the Navy, Viscount Hall, the First Lord of the Admiralty, speaking of submarine warfare, said that they were pursuing the development of the fast electrically driven submarine. In this case there was supplementary machinery to the usual diesel engines of a submarine. There were electric batteries which were charged and would give a boost to the submarine for, say, nine, twelve, or possibly fourteen nautical miles, but could not give the boost for more than three-quarters of an hour. The speed was actually raised to about seventeen knots.

This type was not the only electrically driven submarine of which they had had actual experience in operation. They had also had experience of the hydrogen-peroxide propelled machine. He was satisfied that there was no naval power in the world which had greater knowledge of this form of propulsion than they had.

Damage to Telephones

Mr. Ness Edwards told Mr. J. Morrison that about 1,230 poles were broken or brought down in the recent snowstorm, and 37,800 subscribers were cut off. The total

cost of the damage was about £200,000. Telephone lines were being increasingly provided in underground cables and this reduced the risk and extent of storm damage.

Electricity in Wales

Replying to Mr. Emrys Roberts, Mr. Noel-Baker said the amounts of electricity generated and sold to consumers in Wales and Monmouthshire (including a part of Cheshire) in millions of kWh in the last two years were as follows: Year ended 31st March, 1949: Generated 2,965; sold 2,666. Year ended 31st December, 1949: Generated 2,823; sold 2,752.

Scottish Schemes

In reply to questions in the House of Commons on 9th May, Mr. McNeil, Secretary of State for Scotland said that in Lewis (Hebrides) electricity distribution lines were at present being erected in the Eye Peninsula and in the Tolsta area, and power was being provided for new consumers in this area continuously. Work had begun on the lines from Stornoway to Barvas and to Ness.

The following transmission line schemes were under construction or it was hoped to begin them during 1950: Sloy-Glasgow, Tummel-Garry-Bonnybridge, Fannich-Boat at Garten, Keith-Aberdeen, Fasnakyle-Beauly, Shira-Inveruglas, Tummel Bridge-Inveruglas, Aberdeen-Dundee and Fasnakyle-Fort Augustus.

Electricity Compensation

Mr. Herbert Morrison, Lord President of the Council moved that the Draft Electricity (Commissioners and Others) (Compensation) Regulations, 1950, be approved.

In the debate which followed, Mr. Robens, Parliamentary Secretary, Ministry of Fuel and Power, said that one part of the regulations dealt with compensation for members of the Central Electricity Board and the second with compensation for officers of the Electricity Commission, who numbered 128, of whom 103 had been transferred to the Ministry of Fuel and Power and were on the staff of the Ministry at present. The other 25 were transferred to the electricity industry, and were themselves in employment, and in no cases were they working under conditions or with emoluments worse than they had previously. The regulations merely safeguarded those people against what might happen in future, and the safeguard was identical with that for every other person of similar standing in the electricity industry. If within ten years their position worsened it was automatically deemed to have been due to the Act and the onus of proof was laid on the Electricity Boards.

Col. Crosthwaite Eyre said there was a difference in the method of awarding compensation to officers and members of the Electricity Boards. On the one hand there were the officers, whose compensation would be in the form of an annuity on which income tax would be paid, while, on the other, the Commissioners, who were going to get a lump sum on which no tax would be paid.

The eight-year qualifying period and the limit of £4,000 applied to officers, but not to Commissioners. So the Government was creating this wonderful privileged body of people. If a clerk applied for compensation the Electricity Board's decision was final, but the Commissioners had a special tribunal to deal with their appeals.

Mr. Robens said they had genuinely tried to carry out the requirements of the Act and to bring in fair regulations which were comparable in relation to all the people covered by similar regulations.

Mr. Geoffrey Lloyd asked whether these lump sums would be tax free or not. If it would be the case that Sir John Kennedy and Mr. Nimmo would be entitled to such payments, could the Minister explain the difference between these cases and the cases of Sir John Black and Mr. Lord.

Mr. Robens said the question of taxation of any compensation was not covered by the regulations. Such a question might suitably be addressed to the Chancellor of the Exchequer.

The regulations were agreed to.

Industrial Gas Turbines

THE annual May Lecture of the Institute of Metals was delivered at the Royal Institution last week by Dr. H. Roxbee Cox, who spoke on industrial gas turbines, discussing at some length their use as prime movers in the generation of electricity.

As gas turbines in this country would be run, at any rate to begin with, on distillate fuel, they could only be an economic proposition at a very low load factor, of the order of about 10 per cent. This meant that unless the gas turbine could be developed to run on cheap fuel its application to power generation could only be limited. One possibility was residual oil, but others which were more likely to appeal were our only indigenous fuels, coal and peat.

Dr. Roxbee Cox believed that the thermal efficiency of the gas turbine could be raised as high as 40 per cent, and if burning a cheap fuel this would make it most attractive. To compete with large steam turbines, however, it would have to be developed to much larger sizes than any yet made or projected, otherwise an economic case for smaller units must be proved.

Illuminating Engineers

Summer Meeting at Buxton

THE second provincial summer meeting of the Illuminating Engineering Society has been taking place this week in Derbyshire under the presidency of Dr. J. N. Aldington. The proceedings began with a civic reception followed by dancing at the Pavilion, Buxton, on Tuesday evening. Next morning the Mayor officially opened the technical sessions, papers being read in the morning and afternoon daily, each followed by discussion.

The annual general business meeting of the Society was held on Thursday and there was dancing in the evening at the Palace Hotel after the president's reception. Other social events were a mannequin parade, ladies' visit to Haddon Hall and general tour of the Derbyshire Dales. Members competed during the week for the Dow Golf Cup over the course of the Cavendish Club. The proceeds are to be allocated to the Electrical Industries Benevolent Association and the Institution of Gas Engineers Benevolent Fund.

Visual Deception

The technical sessions were in the Playhouse Theatre. In the opening lecture, which was popular in character, Dr. L. A. Sayce (N.P.L.) drew upon his experience of the scientific principles of camouflage to explain "visual deception." The eye had been evolved to deal with the continuous spectrum of sunlight and so its perception of colour could be tricked in many ways by artificial mixtures of light; that fact had made possible the art of colour printing and the science of colorimetry.

In the act of vision the image within the eye did not fade so soon as the stimulus ceased, but remained for an appreciable time, which resulted in the blurring of all rapid movement, so making possible the illusion of the cinematograph.

The clue to all visual deception lay in the close partnership of the eye and the brain, the former being the optical "instrument," while the latter was the "reference library." By long experience the brain had learned to perceive certain things about the external world through stimuli supplied, often vaguely and imperfectly, by the eye. When similar stimuli resulted from different causes the old associations asserted themselves and the brain arrive at a very wrong conclusion.

Floodlighting Buildings

The second lecture, by Mr. R. O. Ackerley, was concerned mainly with the application of floodlighting out-of-doors with particular reference to the spectacular floodlighting of buildings. Satisfactory floodlighting depends on effective light control, so equipment used must be well designed optically, to permit the engineer to choose from a range of equipment a unit appropriate to any normal requirement of beam shape and length of throw.

As floodlighting equipment has to operate in all weathers and often in relatively inaccessible positions, it must be robust and watertight, capable of dissipating the heat from lamps, and easy to maintain. Its application involves consideration of factors which are as much artistic as physical, and the determination of the form which the main floodlighting should be directed involves consideration of the angle from which the object is most likely to be viewed, as well as the nature of the architectural features and the depth of the shadow they will cast. This often involves compromise on account of the practical limitations imposed by the facilities available.

Supplementary lighting can be used to emphasize special features, to introduce high-lights or to fill gaps in the main lighting caused by local obstructions. The level of illumination depends upon a number of factors, including the function of the building. Coloured light sources can sometimes be used with advantage.

On Thursday morning Mr. H. Hewitt spoke about the applications of artificial

lighting at all stages in the manufacture of clothing, from the raw fibre to the fabric and from the fabric to the finished garment. After briefly assessing industrial lighting requirements he made observations upon some of the interesting developments in this field and upon possible future trends. More detailed reference was made to the applications of light sources for quality control, particularly with regard to colour matching and light-fastness testing. The rôle of the newer illuminants in display lighting was discussed from the viewpoints of both vendor and purchaser, and a new approach was suggested to the problem of apparent colour-change, viz., the provision of special "fitting cubicles" with three alternative illuminants.

Although necessarily superficial, this review revealed the many ways in which illuminating engineering assists a group of major industries. It is a matter for additional pride that so many lighting applications can contribute both to the quality and quantity of its products. There are, however, some lines along which further progress can be made—for example, the development of lighting units of high efficiency coupled both with low brightness and with reasonable physical dimensions. Further applications of light sources could be made by incorporating them as an integral part of textile machines. The provision of more accurate means of estimating the colour-fastness of fabrics deserves attention, as also does the use of the newer illuminants in display lighting, not only as an aid to selling, but to contribute to the satisfaction of the customer.

Illumination in Sweden

The special address which is customary on the occasion of the annual general meeting was given by Mr. Ivar Folcker, chairman of the National Illuminating Committee of Sweden, a vice-president of the International Commission on Illumination, and president since 1945 of the Swedish Illuminating Engineering Society.

Mr. Folcker indicated that lighting engineers in Sweden were encountering much the same problems as those common to other countries; for example, in the design of fittings for fluorescent lamps and of fittings for installation in homes. Though household lighting accounted for some 60 per cent of the total lighting load in Sweden, the standard of domestic illumination in that country was comparatively low.

Stage Lighting

In a subsequent technical session Mr. L. G. Applebee dealt with stage lighting in the post-war theatre in this country, giving a clear picture of the requirements of stage lighting and indicating some of the difficulties which are met and being overcome. He said that the photometer is seldom, if ever, employed, and that stage lighting to-day is not a wholesale flooding of light over a given area, but is directional, and a large number of lighting units is employed, each being dimmer-controlled so that its intensity can be varied.

The result is not a question of intensity but of illusion or pictorial effect to present to the eyes of the audience the picture, with its dramatic emphasis, that the author had in mind when he wrote the play. The producer is not tied to scientific measurement of light, but wields the free hand of the artist. The illuminating engineer, therefore, stops at the efficiency of his apparatus, the use of which must be purely artistic.

The author indicated the various uses to which the many different types of apparatus are put, and dealt with the elaborate control necessitated by the demands of those who have to use the apparatus and devise the picture to be presented to the audience. The subject of colour was also discussed. One of the outstanding features of post-war stage-lighting equipment is the application of the electronic valve to control apparatus, and this type of stage-lighting equipment was described in comparative detail.

Mr. Applebee felt that British stage-lighting apparatus was as good as, if not better than, any produced by other countries, and it was constantly being improved. Its use and the effects and results obtained are dependent on the technique and artistic sense of the theatrical producer, not the illuminating engineer.

The final lecture of the meeting was delivered by Mr. J. M. Waldram, who reviewed the development of street lighting in this country, tracing it from the

'twenties, when it was treated as an illumination problem, up to the present day. A series of milestones marks the progress made, beginning with the B.S. Specification of 1929, the Sheffield experiments, and the International Illumination Commission meetings in America of 1928. Perhaps the most important of these milestones was the coming of electric discharge lamps in 1932, resulting in new studies and a fresh approach to the whole problem beginning in 1934.

Another important event was the issue of the Ministry of Transport Departmental Committee's report in 1937. The year 1939, however, marked, not progress, but regress, for public lighting in this country ceased for ten years. In the post-war period some technical progress has been made and tubular fluorescent lamps have been introduced, together with improved lanterns.

Mr. Waldram then described the present ideas with regard to the theory of four systems of lighting, viz., non-cutoff, semi-cutoff, cutoff, and unidirectional systems. Briefly reviewing the various features of modern lanterns, he dealt with the outstanding problems of street lighting, and expressed the opinion that the most important of these is the lighting of residential roads.

Maintenance and control problems have not yet been solved, and there is a need for simple lamps of high efficiency, high power and good colour, the light being colour-controlled by lanterns which are simple to maintain and can be reliably controlled from a central point with cheap apparatus.

TRADE WITH THE EAST

AT a recent Press conference in London Mr. M. Watt, of the F.B.I. Commonwealth Trade Department, who has recently returned from a tour of Pakistan, India, Burma and Ceylon, gave some impressions of his visit and the prospects for British trade. Most criticisms, he said, related to British prices and slow deliveries, although the criticism regarding deliveries referred more to the past than to-day, as deliveries were improving generally.

In Pakistan there was at present comparatively little industrial development. Plans were in being for the establishment of industries, which would utilize the raw materials produced, such as jute, cotton and hides, but industrial development would depend to a considerable extent on the development of electric power and water supplies. From 1st April, 1949, to 31st January last the United Kingdom's exports to Pakistan were valued at approximately £34½ million, out of a total of £99 million. Competition from Japan and Germany was, however, rapidly increasing.

In India great progress had been made in industrial development since partition. Recent figures showed that in the eight months ended 30th November last, imports from Japan were three times as great as in the twelve months ended 31st March, 1949. The Government of India was giving every encouragement to foreign countries to establish industries, and negotiations were proceeding for setting up a number of factories including a dry core cable factory, a machine tools factory, a heavy electrical plant factory, a steel project, radar and radio equipment manufacture, and telephone industries. It was calculated that less than 2 per cent of hydro-electric potential had been tapped. However, there were now six main combined hydro-electric and irrigation schemes and fifteen lesser projects. Mr. Watt considered that India would provide an important market for industrial equipment for many years to come, provided she was able to solve her various problems. The market for consumer goods was bound to shrink as new industrial projects got under way.

Conditions in Burma at the moment were depressing. It was a country of tremendous resources which were going to waste to-day. Japanese goods were beginning to flow in, while increasing competition could be expected from India and Australia.

The Government of Ceylon had various plans in being for industrial development and among other projects were a hydro-electric scheme now in progress, and a scheme for the generation of electricity and the irrigation of an area of 60,000 acres.

Grand Coulee Dam

ON Thursday last week President Truman dedicated the Grand Coulee Dam, on the Columbia River in the State of Washington, and the Franklin D Roosevelt Lake, which is the reservoir held up by the dam. These are part of a combined power and irrigation scheme. The power plant will comprise eighteen generators rated at about 130,000 kW each; thirteen are already installed.

Commerce and Industry

Electrical Contractors Conference
Northern Ireland Salaries Claim

ON Wednesday, Thursday and Friday next week the Electrical Contractors Association and its allied organizations are holding their annual conference at Hastings under the presidency of Mr. S. Dickinson. It opens with a Council meeting on the Wednesday morning and in the evening there will be a reception by the president at the Queen's Hotel.

Thursday begins with a civic welcome at the White Rock Pavilion, after which Mr. Dickinson will deliver his presidential address. Then a paper will be read by Mr. S. L. M. Barlow, Associate I.E.E., on "Trend in the Development of New Techniques in Electrical Installation"; a discussion will follow to be continued in the afternoon. At the Pavilion in the evening delegates will be received by the Mayor of Hastings (Councillor J. D. Cooper). The annual general meeting will be held on Friday morning after which the new president will be installed and will deliver a short address. A garden party is being arranged for the afternoon and the final function is a smoking concert and dance.

A.S.E.E. Exhibition

New ground was broken on 2nd May by the North West London Branch of the Association of Supervising Electrical Engineers, when a members' electrical exhibition was held at St. Hilda's Hall, South Harrow. The small but selective display covered a wide range of electrical equipment and included electric motors, fluorescent lighting fittings and telephone equipment. The exhibition was opened by Mr. A. G. Ramsey, president of the Association, who congratulated those who had conceived the idea of an exhibition, an experiment inspired, perhaps, by the desire to do something on a more extensive scale later for the good of the Association. They need not fear the future as the Association had been built on a solid foundation and would continue to progress along those lines which were linked with service in its widest meaning. The exhibition was an indication of the initiative which went with success.

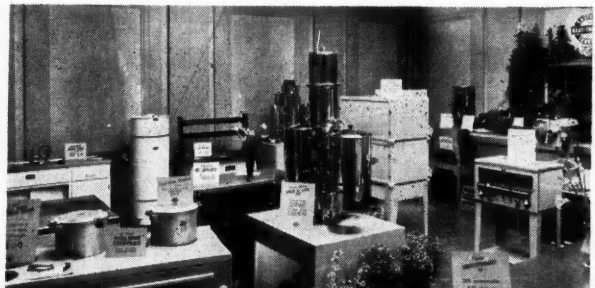
At the opening of the A.S.E.E. North West London Branch exhibition. Left to right: Mr. A. Branmer, Mr. A. G. Ramsey, Mrs. Branmer, Mrs. Ramsey, Mr. E. Butler and Mrs. Butler

Ulster Engineers' Claim

An application by electrical power engineers employed by the Electricity Board for Northern Ireland and Belfast and Londonderry Corporations that their salaries should be raised to the level of those paid in Great Britain has not been accepted by the employers. In consequence the Northern Ireland branch of the Electrical Power Engineers' Association has given 21 days' notice, which expires on 29th May, to withdraw their services. The chairman of the Belfast Electricity Committee is reported to have told Press representatives that the decision was due to a misunderstanding. He said that a basis had been reached in earlier discussions upon which further negotiations could have resulted in a satisfactory settlement.

The "Empress of Scotland"

The "new" *Empress of Scotland* left Liverpool for Quebec calling at the Clyde for the first time on 9th May. As the *Empress of Japan* she was the largest and fastest boat on the Pacific service but after wartime service as a troopship has had an



Section of the commercial cooking and refrigeration exhibition of the Suffolk Sub-area of the Eastern Electricity Board at Clacton

extensive refitting and has been rechristened. Substantially her electrical equipment is unchanged. She has two steam driven turbo-generators one condensing and one pass-out, the steam from the latter being used as boiler feed heating. She also has four 302 kW diesel-driven generating sets. This variety of equipment enables the most thermally efficient combination to be chosen for any condition and provides a very adequate standby, for the normal cruising electrical load is about 1,000 kW.

The ship has been extensively equipped with cold cathode lighting and to supply this two 75 kVA (230 V 50 c/s) motor-driven alternators have been installed. These sets will also provide standby supply for the amplification and communication equipments. This lighting has been so arranged as to give the impression of a cosy atmosphere in cold weather and a cooler appearance in hot weather.

The builders, the Fairfield Shipbuilding & Engineering Co., Govan, were responsible for the refitting, and the contractors for the electrical equipment were: Main turbines, C. A. Parsons & Co.; steam turbo-generators, W. H. Allen, Sons & Co.; radar, Marconi's; fire alarms, d.c./a.c. convertors, and lighting, General Electric Co.

Copper Price

In our last issue we erroneously stated that there had been a further increase in the price of copper—to £170 a ton. Actually the price of h.c. electrolytic copper remains at £162 a ton.

Catering Equipment Exhibition

Hoteliers, caterers and proprietors of boarding houses, starting the 1950 season, were keenly interested in a three-day exhibition of electric commercial cooking and refrigeration equipment recently organized by the Suffolk Sub-Area of the Eastern Electricity Board at Clacton-on-Sea. Exhibits which attracted greatest attention were the Staines auto-sink and the glass-washer by the same makers. The Crypto-Rotapan cooker, which was demonstrated daily, and an attractive Rouse fish and chip range were also the subject of much interest. Creda restaurant ranges and grillers were shown, and Jacksons were represented by their No. 7 cooker and pastry ovens, vegetable boilers and urns. Swallow peelers and mixers, "Asco" slicers, Stott café equipment, and water boilers by Santon were also exhibited. The refrigeration section had a comprehensive display ranging from the smaller domestic refrigerators to the 40 cu ft coldroom and included Lightfoot conservators and frozen food cabinets. The orders and inquiries obtained have repaid the efforts of all concerned.

Switchboard Wires for Australia

Several large orders for switchboard wire have been awarded by the Australian Post

Manufacturing silk- and cotton-covered switchboard wire at the Melling Works of British Insulated Callender's Cables Ltd.

Office to British Insulated Callender's Cables, Ltd. The orders call for a total of 3,815 core miles. Delivery, which commenced last November, is at the rate of 80 core miles per week and will be completed in August this year.

Metal Price Increases

A further increase in the price of zinc has been announced by the Ministry of Supply. From 10th May the price is raised by £4 per ton to £103 10s per ton, delivered. The Zinc Oxide Manufacturers also announce an advance of £3 10s per ton in the prices of zinc oxides in lots of not less than two tons delivered buyers' premises.

From 11th May, the price of lead has been raised by £2 to £92 per ton.

High-Voltage Switch-Fuse

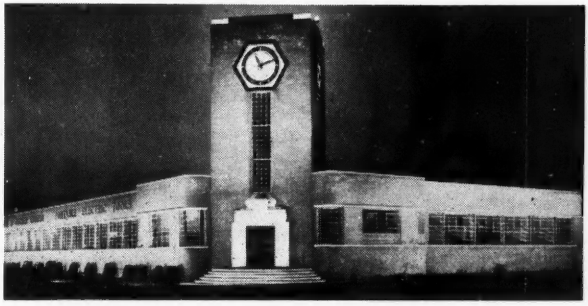
In the article on high-voltage switch-fuses by K. Dannenburg, which appeared in last week's issue, an error occurred in the description appended to Fig. 3, the word "old" having been used instead of "oil" with reference to the type "OD" isolators. This use of the word "old" is, of course, misleading as the isolators in question are of new design arranged to line up with the type "VL" fuse-switch.

Exide Convention

The Exide Service Agents' Convention comes of age this year when the twenty-first of these annual events is held at Bournemouth on 21st-23rd June. Hundreds of delegates from all over Great Britain and from abroad will take part in a programme that includes, besides a number of business sessions, the customary social functions.

Factory Floodlighting Installation

An effective installation of "Osram" floodlighting has been carried out at the factory of Black & Decker, Ltd., electric tool makers, on the Bath Road at Harmondsworth, Middlesex. Nineteen 85 W sodium lamps and twenty 400 W neon red discharge lamps are installed alternately in G.E.C. floodlights, the red lamps giving full value to the red brick frontage, while the sodium lamps assist in picking out the white stone of the entrance, window surrounds, and clock face, together with the company's name and other light-coloured features. The floodlights are installed at 12ft centres and are spaced approximately 10ft from the front of the building. The contractors for the installation were the Phoenix Electrical Co. (London), Ltd. This factory adjoins London Airport, and extensive tests were made by the airport authorities before the installation was passed. Provision has been made for remote control of the lighting from the airport should this be required.



The factory of Black and Decker, Ltd., floodlighted by "Osram" floodlighting units

Aberdeen Electrical Exhibition

Equipment and devices not previously shown to the public, and others straight from the British Industries Fair, will be on the stands of a large electrical exhibition which opens at the Music Hall, Aberdeen, on 23rd May. It is being organized by the North of Scotland Hydro-Electric Board and leading manufacturers. It will be opened by Lord Provost Fraser of Aberdeen, and will run for five days.

Scottish Television Plans

Details of the B.B.C.'s new television station at Kirk o' Shotts, Lanarkshire, were given on 10th May at the monthly meeting of Lanark County Council. Plans for the buildings and 750ft masts were approved. Preliminary surveys of the site are now complete, and B.B.C. technicians are ready to start work on the transmitting station, but so far there is only tentative agreement on the proposals.

Brush Sales Conference

A sales conference was held at the Brush Electrical Engineering Co., Falcon Works, Loughborough, on 3rd, 4th and 5th May, under the chairmanship of Mr. R. Bate, sales director. The conference was opened

by Mr. J. W. C. Milligan, director and general manager, and was addressed in its closing stages by Mr. Alan P. Good, managing director. In addition to all home district office managers, representatives of the Brush organization in India, Malaya, Australia, Brazil and Europe were present. A wide variety of subjects covering all the company's electrical products were discussed, and the conference ended with an informal dinner.

Electricity Supply Law

"The Electricity Supply Statutes," by J. W. Simpson, O.B.E., F.C.I.S., and C. J. Hornby, F.C.C.S., has been reprinted and is available from 16, Stratford Place, London, W.1, at 15s, plus postage. We are informed that the work has been adopted by the National Association of Local Government Officers for use in its course on electricity law.

Trade Announcements

The **General Electric Co., Ltd.,** announces that it has acquired the system of picture telegraphy previously made and sold by the Unit Telephoto Co., Ltd., of West Nile Street, Glasgow. Manufacture and selling of the equipment will in future be carried out by the G.E.C. and production of the apparatus has already started in the company's telephone works at Coventry.

The London office of the **Sheffield Twist Drill & Steel Co., Ltd.,** has been removed to Terminal House, Lower Belgrave Street, S.W.1.

Cantie Switches, Ltd., has appointed district engineers in the following areas: London and Home Counties: Mr. R. W. Hayward (London manager), 12, Caxton Street, London, S.W.1. Lancs, Cheshire and N. Wales: Mr. J. Shepherd, Lloyds Bank Buildings, 53, King Street, Manchester. Midlands: Mr. T. R. Clemence, Somerset House, Temple Street, Birmingham, 2. Yorkshire: Mr. N. Rayner, Legal & General Buildings, 7, South Parade, Leeds, 1. Northumberland, Durham, Cumberland and Westmorland: Mr. W. M. Cole, 41, Ferndale Avenue, East Boldon, Co. Durham. Scotland: Mr. T. C. Paton (acting), 48, West Regent Street, Glasgow, C.2.

New Zealand Radio Beacons

The International Marine Radio Co., Ltd., Croydon, has received an order from the New Zealand Posts & Telegraphs Department for seven radio beacon transmitters and accessories. The transmitters will have an output power of approximately 100 W and seven receivers will be used for time signal reception and automatic control equipment installed in duplicate; duplicate motor-alternator sets and change-over switch gear are also being supplied. A supplementary order has since been received for three additional sets of automatic control and code sender equipment for use with existing radio beacon stations in New Zealand.

Sign Manufacturers

The Electrical Sign Manufacturers' Association has issued a statement on the origin and aims of the Association, giving particulars of qualifications required for membership, benefits of membership, how the Association works, and its co-operation with other bodies. Copies can be obtained from Mr. B. Moss, secretary, Kingsway House, 103, Kingsway, London, W.C.2.

Raw Material Surveys

We have received from the Purchasing Officers' Association, Wardrobe Chambers, 146a, Queen Victoria Street, E.C.4, three further additions to its Raw Material Survey series. They are: No. 8, "Timber," by P. L. Money (2s 3d); No. 11, "Wool," by S. Kershaw (1s 9d), and No. 15, "Cereals," by J. F. Blitz, M.A., B.Sc. (2s 6d).

Catalogues and Lists

Edwards' Manufacturing Co., Ltd., Manor Hill, Birkenhead.—Priced leaflet describing the properties of "Penetreen" rust solvent and creeping lubricant.

Metway Electrical Industries, Ltd., King Street, Brighton, 1.—Priced catalogue of sliding dimmers and industrial heating elements.

Salford Electrical Instruments, Ltd., Peel Works, Silk Street, Salford, 3, Lancs.—Folder on "Klixon" devices for motor protection.

Britannia Batteries, Ltd., 66, Victoria Street, London, S.W.1.—Catalogue of "Alklum" steel-alkaline batteries.

Thorn Electrical Industries, Ltd., 105-109, Judd Street, London, W.C.1.—Folder on fluorescent stage lighting equipment.

Blackburn & Oliver, Ltd., No. 2 Factory, Lamberhead Industrial Estate, Wigan, Lancs.—Technical brochure on "Synphorn" synthetic resins and cements.

Sifam Electrical Instruments Co., Ltd., Leigh Court, Higher Lincombe Road, Torquay, Devon.—Catalogue of indicating instruments and associated accessories.

George H. Scholes & Co., Ltd., Wylex Works, Wythenshawe, Manchester.—Priced catalogue of "Wylex" and "Sonex" accessories.

British Industries Fair

Functions in Birmingham and London

FIGURES of attendance at this year's British Industries Fair, which closes to-day after a fortnight's run, published by the organizers, indicate that there has been an increased number of visitors from overseas countries. It was claimed that during the first six days there had been 50 per cent more buyers from the United States than last year. On the other hand the attendance of home buyers seems to have fallen and the public has shown less interest.

B.E.A.M.A.—E.D.A. Luncheon

The official visit of the British Electrical and Allied Manufacturers' Association and the British Electrical Development Association to the Castle Bromwich Section of the Fair took place on 9th May. Welcoming the representatives of the two associations at luncheon Mr. Walter Higgs, chairman of the Fair Management Committee, said the electrical industry was now the third largest in the export drive.

The electrical industry did not get so much publicity as the car industry, but the value of its exports had increased six times since 1938, without including the large amount of electrical equipment which was exported in machine tools and other machinery. The automobile industry's export success was a "flash in the pan," but the world was still starved of big electrical plant and the demand would continue for many years to come. What the industry had done in the past, said

At the E.D.A.—B.E.A.M.A. luncheon, Castle Bromwich: Mr. J. H. Dinsam (South Wales Electricity Board), Mr. A. W. Bonell (London Electricity Board), Mr. S. C. Hurry (Jackson Electric Stove Co.) and Mr. R. E. Gamlen (South Eastern Electricity Board)

Sir Vincent de Ferranti, Mr. S. F. Steward, Mr. G. Leslie Wates (chairman, B.E.A.M.A. Council), Mr. B. H. Leeson (director of B.E.A.M.A.) and Mr. Victor W. Dale (general manager and secretary, E.D.A.)

Mr. Higgs, was nothing to what it could do in the future. He saw no reason why it should not move into second or, come to that, first place in regard to exports.

Mr. G. Leslie Wates, chairman of the B.E.A.M.A. Council, declared that the export trade was based on home trade. Manufacturers and distributors here could play a vital part in export trade by using and assisting in the development of British electrical products. Distributors could help in educating overseas engineers so that when they returned home they would be accustomed to British goods and would encourage their own countries to "Buy British," Last year B.E.A.M.A. had sent overseas four important missions to help in that direction, including two to Canada and one to Pakistan.

Referring to the ending of Marshall Aid in 1952, Mr. Wates said that in a way that assistance had been a bit of a disaster for us. If we had tightened our belts and taken our medicine then, we should be in a much better position now. Certainly by 1952 we had got to stand on our own feet and the electrical industry accepted that challenge.

Mr. S. F. Steward, chairman of the South Western Electricity Board and a member of the E.D.A. Council, said that there was enormous scope in Britain for industrial electrification. This country was in a poor position relative to the United States in the horse-power available per worker in industry. They were determined to encourage the development of the use of electricity in industry, in homes and on the farms to the fullest extent, and he stressed the need for co-operation between the electricity supply authorities and the manufacturers.

Export Gala

An innovation in connection with this year's British Industries Fair, and judging from the large numbers who attended, a very popular one, was an Export Gala organized by the Institute of Export, held at the Empress Hall, Earl's Court, London, on Friday last. Large contingents came from Birmingham, whilst the sound of foreign and North American accents indicated the presence of a good sprinkling of overseas visitors who must have been pleasantly surprised at the excellent catering arrangements in an "austerity" country. Dancing was to three well-known dance bands, and the cabaret included many popular B.B.C. artists.

The assembly was welcomed by Mr. Leslie Gamage who, in introducing Sir Stafford Cripps, Chancellor of the Exchequer, assured overseas visitors that while our currency had been devalued, there had been no devaluation in the quality of British goods.

Sir Stafford commended the Institute on its enterprise in organizing such a function, and said that the Fair had created new records. Up to Friday night last more than 11,000 overseas visitors had paid visits to the Fair, an increase of 10 per cent over the record figure of last year. One thing which gave great pleasure this year was to hear from North American visitors how greatly they thought our salesmanship and methods had been sharpened up for the dollar drive. All our energy and inventiveness and all our receptiveness too must still be devoted to this end.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month of 10th May.

LASCO. No. 681,111. Class 9. Combined radio and navigation apparatus and instruments, signalling apparatus, and television apparatus and instruments, and parts.—Land, Air & Sea Instrument Co., Ltd., 14, Southampton Place, Bloomsbury, London, W.C.1.

EGA (design). No. 683,910. Class 9. Starter switchgear for electric motors.—Ega Electric, Ltd., Holyhead Road, Wednesbury, Staffs.

ELLIOTRONIC, ELLIOTTRON, ELLIOTRON, ELLIOTROL, ELLIOTROL, ELLIOTTROLIC, ELLIOTKOLIC, ELLIOTMATIC, ELLIOMATIC. Nos. 685,686-94. All Class 9. Electrical apparatus and instruments included in Class 9; and scientific, nautical, surveying, wireless, weighing, measuring, signalling and checking (supervision) apparatus and instruments; and calculating machines.—Elliott Brothers (London), Ltd., Century Works, Lewisham, London, S.E.13.

MOLDSEAL. No. 686,521. Class 9. Electric capacitors (condensers).—A. H. Hunt, Ltd., Bendon Valley, Garratt Lane, London, S.W.18.

SENTRY. No. 656,339. Class 11. Electrically heated furnaces for the heat treatment and melting of metals, and parts.—The Sentry Co., Foxboro, Massachusetts, U.S.A. Address for service c/o Stevens, Langner, Parry & Rollinson, 5 to 9, Quality Court, Chancery Lane, London, W.C.2.

THE WILSON ELECTRIC (design). No. 674,542. Class 12. Electrically propelled road vehicles.—Partridge Wilson & Co., Ltd., Davenset Electrical Works, Evington Valley Road, Leicester.

E.T.U. Policy

Annual Conference at Ramsgate

THOUGH the bulk of the resolutions on the agenda of the Electrical Trades Union's annual policy conference which is being held this week at Ramsgate, under the chairmanship of Mr. F. Foulkes, general president, are naturally concerned with wages and conditions, others range over a variety of subjects. Among these may be mentioned education, safety of domestic electrical apparatus (abolition of two-pin outlets for movable apparatus is suggested), electrification of rural areas, purchase tax on electrical apparatus, international trade, the world situation and the atomic bomb.

Altogether there are 121 resolutions, a number of them composite; this is rather less than half last year's total. They include a series on general wage policy referring to the effects of devaluation and expressing dissatisfaction with the wage "freeze," etc.

National Minimum Rate

Quite a few raise questions which have been before the conference previously, such as the suggested national minimum rate for all electricians. When this matter was considered by the Executive Council following last year's conference it was agreed that the policy of the Union to negotiate a national rate, with a "plus differential" for London, should be continued. The conference is now asked to resolve that the time has arrived when one rate of pay should be established for all electricians (contracting, maintenance and supply) and that the Executive Council should be urged to do all in its power to achieve this end. Other suggestions are that shipbuilding and shiprepairing electricians should also be included and that the rate should be not less than that operating in the London area.

Questions raised by the contracting side include a suggestion that the Executive Council should reopen negotiations with the N.F.E.A. for an increase of 6d per hour in the basic rate, which it is felt that the employers could afford to meet out of profits.

Among resolutions put forward by the supply side is one "deploring" the difference of the hourly rate of manual workers and the adminstrative and clerical staff. Raising of the status and rate of substation attendants is also sought and "control room operative" is suggested as a suitable title.

Under "Engineering" there are resolutions urging greater efforts to negotiate a national agreement on a satisfactory basis of grading for all telephone workers; and to frame a national wage structure for radio and electronic workers (the establishment of sole negotiating rights for the E.T.U. in all spheres of radio and electronic work is also sought). In shipbuilding and ship repairing grave concern is expressed at the prospect of further unemployment and a proposal is put forward for training those already skilled but unemployed to fit them for jobs in other industries.

The section dealing with general industrial and trade subjects raises a question of age barriers and urges that steps should be taken to prevent the fixing of such age limits which men and women too old to take part in superannuation schemes. Formulation of an apprenticeship scheme for all industries; a minimum annual holiday of two weeks; and a tool allowance for electrical workers are other suggestions.

Registration and Rules

The conference is asked to reaffirm its belief in the necessity for the registration of electrical operatives and contractors and to call upon the Executive Council to press for legislation to this end. It is also felt that Union policy should urge public enforcement of the I.E.E. Regulations or other measures necessary to make electrical apparatus safe.

Under the heading of "Nationalized Industries" there is a proposed resolution seeking an alteration of the Electricity Act, 1947, to make it a statutory obliga-

tion for Area Electricity Boards to set up contracting departments entirely separate in all respects as to the purchase, sale and installation of equipment.

A special Executive Committee resolution urges the introduction of legislation to ensure that the development of the nationalized electricity supply industry should not be burdened with compensation charges, which should be met out of the national debt fund; that compensation stock interest should be reduced by 50 per cent and should cease altogether after 25 years; and that future development charges should be met by the Government instituting an annual capital tax.

Another resolution regrets that many personnel in control at management level have been actively opposed to the principle of nationalization and reiterates that there should be a greater degree of direct workers' control.

Executive Council's Report

The report of the Executive Council records in detail the wage discussions and agreements during the year and the steps taken on the resolutions passed at last year's conference. With regard to the B.E.A.'s powers to manufacture equipment, the matter was placed in the hands of the general president (Mr. F. Foulkes) for reference to the National Joint Advisory Council. He reported that with regard to the lack of boiler plant, boiler tubes and water valves he had raised the question of the B.E.A.'s manufacturing its own plant. This was rejected by the Authority, but a complete survey of the boiler manufacturing industry was undertaken. Advantage was to be taken of facilities in shipyards where boiler shops were suitable for h.p. boiler construction. Water valves had been ordered from three firms in Italy.

The report shows that membership of the E.T.U. increased during 1949 by 5,745 to a total of 187,520. Under the new area organization brought into operation during the year there are now 26 area offices and 36 area full-time officials, as against 19 offices and 28 officials previously.

The Union's convalescent home at Rustington House, Sussex, is now in use, but owing to objections by the local council to the use of the selected building it has not been possible to open the proposed college.

President's Address

In his presidential address Mr. Foulkes said that the future wages position throughout the United Kingdom would be largely determined by the result of the "Arbitration or Strike" ballot now taking place amongst shipbuilding and engineering workers.

The Confederation of Shipbuilding and Engineering Trades Unions had presented trade unionists within the shipbuilding and engineering industries with an opportunity of demonstrating their determination to obtain a fair share of the increase in production that had taken place within those industries.

He was confident of the result of the ballot among the members of the E.T.U. Although their union was in a small minority in its opposition to the wage "freeze" at the 1948 Trades Union Congress, it now found itself in a majority.

A deliberate attempt was being made to split the skilled from the less skilled workers and care must be taken in examining the arguments used in support of a guaranteed minimum rate. This could not be obtained at the expense of other workers.

Britain still led the world in engineering and shipbuilding products. British craftsmanship was unsurpassed. Production had increased, profits had soared. Wages must be measured by these standards.

Mr. Foulkes said that in the light of their experiences of nationalized industries, they reiterated that nationalization was not socialization but was merely a change of ownership. Economically nationalization was a progressive advance on private enterprise, but it had not changed the status or the relationship of the employees in the industry which was still that of employee and employer. Their was no provision for workers' direct participation in control and management.

On Monday Mr. R. G. McLennan, national officer, made a statement on the proposed apprenticeship scheme for the contracting industry. He said that after protracted negotiations everybody had agreed that 1st June should be the operative day. But there had been delay on the part of the N.F.E.A. and the matter

had been referred to the Ministry of Labour as a dispute.

Explaining the position regarding the wages scheme for the contracting industry Mr. W. C. Stevens, general secretary, stated that they went to the National Arbitration Tribunal last year when the matter was deferred. The Union made certain proposals which were rejected. It had reported back to the Tribunal failure to agree and the hearing was to be resumed on 29th June.

A decision to reopen negotiations for an increase of 6d per hour in the basic rate of members employed in the contracting industry was taken on Tuesday. About 45,000 workers, a quarter of the Union's membership, would be affected by such an increase, and it would cost employers about £9,000 per working day, or £2,340,000 a year.

The resolution, moved by Mr. J. Bull (London) stated: "We feel that the employers can afford this increase out of the profits without passing the cost on to the public." Mr. Bull said that a system of payment by results was impracticable because of the numerous small contractors in the industry and the lack of standardization of materials. They wanted efficient work in the electrical industry; all electrical installations should have a life of twenty years.

The President, Mr. Frank Foulkes, said that the resolution now became executive policy.

The Conference carried, with only 16 dissentients out of the 325 delegates, an Executive Council motion, proposed by Mr. Walter Stevens, general secretary, to fight against wages restraint and urging the statutory control of profits.

Engineers-in-Charge

THE forty-fifth annual dinner of the Institution of Engineers-in-Charge was held on 12th May, when Sir William Larke (president) presided over a gathering of about 200. Proposing "The Institution" Sir Herbert G. Williams, M.P., described the existence of institutions of that kind as exemplifying the British talent for self-organization. The title of the Institution implied that its members had to accept responsibility and make decisions and in this they were guided by the high standards of conduct prescribed. As an advocate of inequality and of rewards to the ablest men, he urged that engineers should be inspired by the spirit of adventure based upon good technical education.

Responding, Sir William Larke said that the membership of the Institution had doubled within the past twenty years, throughout the Empire as well as in London and the provinces at home. Its standing was indicated by some bodies specifying membership as a requisite qualification for engagement, since technical knowledge of the whole range of engineering was required and this encouraged broad views. Engineers had individually a special responsibility for the economic recovery of this country and the re-establishment of its moral leadership.

A reply to the toast of "Our Guests and Visitors," which had been proposed by Mr. R. Chalmers (vice-president) was made by Vice-Admiral Sir Denys Ford, recently retired from the post of Engineer-in-Chief of the Fleet. He claimed that the Royal Navy trained the largest number of engineers-in-charge and gave the best training in the world to both engineer officers and artificers.

Thanks to the president for his work for the Institution were voiced by Mr. W. J. Watkins (chairman of the Technics Committee), who coupled with them best wishes to Sir William and Lady Larke on the occurrence of their recently celebrated golden wedding and his seventy-fourth birthday. The president in reply paid tribute to the work of Mr. A. E. Penn and Capt. A. T. Penn, hon. secretaries.

British Equipment for Argentina

TWO substantial export orders have been secured by British Insulated Callender's Cables, Ltd., as a result of tenders submitted through their agents in Argentina, Colson, Brookhouse & Pyne, Ltd. The two orders call for the manufacture and supply of over 4,500 yards of varnished cambric insulated, lead sheathed cables (including single-core and three-core types for working voltages of 1,000 V and 10,000 V), and for a total of 342.5 kVAr of power capacitors (comprising three 100 kVAr capacitors for 2,300 V, 50 cycles, 3-phase, complete with cable boxes; one 5 kVAr, one 20 kVAr, and seven 2.5 kVAr capacitors for 380 V, 50 cycles, 3-phase). This equipment is to be used by Acindar Industria Argentina de Aceros, S.A., in connection with their new steel mills extensions.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

REPORTS AND DIVIDENDS

British Insulated Callender's Cables, Ltd., reports group trading profits for 1949 of £6,738,264, as compared with £6,596,476 for the preceding year, to which are added income from investments, receipts applicable to earlier periods and provisions no longer required, making £7,048,256 (against £7,363,377). From this are deducted provision for depreciation £771,131, interest £85,738, transfers to "provisions" £135,023, underwriting and issue expenses written off by subsidiary £24,000, and taxation £3,150,567, leaving a net profit of £2,881,797 (against £2,669,734). The proportion attributable to the holding company is £2,628,835 (against £2,337,791). Capital reserves receive £4,630 and revenue reserves £2,046,466. It is proposed to pay a final ordinary dividend of 4⅔ per cent, again making 6⅔ per cent for the year. The balance carried forward is £1,292,059 against £1,115,559 brought in.

Allen West & Co., Ltd., report a consolidated trading profit for the year ended 31st January of £722,728, as compared with £714,267, plus dividends on investments £6,547, and profit on foreign exchange due to devaluation of sterling £5,139, making £734,414. Taxation absorbs £334,645, directors' emoluments, etc., £34,572, depreciation and amounts written off £60,342, and after making other provisions, there is a balance of £279,466 (against £243,582), to which is added £150,813 brought in, making £430,279 available. Capital reserve of Allen West & Co., receives £77,431, general reserve £150,000, and subsidiary general reserve £30,000. The dividend on the enlarged capital is 7½ per cent (same), plus a bonus of 2½ per cent (same). The balance carried forward is £119,223.

Sydney S. Bird & Sons, Ltd., report a group profit, after tax, of £5,834 for 1949 (against £5,268 for 1948). A first and final ordinary dividend of 12½ per cent for the year is proposed.

Richard Johnson & Nephew, Ltd., report a group trading profit for the year ended 31st March last of £749,883, as compared with £800,936 for the preceding year. After deducting depreciation £118,648, obsolescence £15,307, and taxation £295,227, it is proposed to pay a final ordinary of 10 per cent, making 15 per cent for the year (same). General reserve receives £280,000 and £71,311 is carried forward (against £66,910 brought in).

Newman Industries, Ltd., in a preliminary statement, reports a group profit for 1949 of £22,776, as compared with £49,633 for 1948. It is proposed to pay a dividend of 10 per cent, less tax, for the year on the ordinary stock (against 17½ per cent, less tax, composed of an interim of 7½ per cent and a final of 10 per cent).

Ever Ready (Ireland), Ltd., reports a trading profit for the year ended 31st March last of £16,796, as compared with £13,997 for the preceding year, and a net balance of £13,862 (against £11,265). The ordinary dividend for the year is maintained at 12½ per cent, and £9,758 is carried forward (against £5,596 brought in).

The British Vacuum Cleaner & Engineering Co., Ltd., reports a trading profit for the year ended 30th September last of £99,189, as compared with £107,414 for the previous year, and a net profit of £50,560 (against £52,110), to which is added £29,369 brought in. After transferring £26,284 to income-tax and profits tax reserve, it is proposed to pay a dividend of 20 per cent on the ordinary shares for the year (unchanged) and to carry forward £32,607.

The River Plate Electricity & Other Securities Corporation, Ltd., reports a profit for the year to 15th April last of £38,047, as compared with £36,480 for the preceding year. General reserve receives £8,250, and the dividend for the year is maintained at 8 per cent by a final payment of 5 per cent. The balance carried forward is £16,533 (against £16,179 brought in).

Vent-Axia, Ltd., reports a profit before tax, subject to audit, for the year ended 31st March last, of £66,312, as compared with £70,040 for 1948-49. Taxation absorbs £37,218, and general reserve receives £10,000. It is proposed to pay a final dividend of 37½ per cent making 62½ per cent for the year. The amount distributed for the year is the same as last year on increased capital. The balance carried forward is £8,217 (against £7,120 brought in).

The Lancashire Dynamo & Crypto, Ltd., reports a consolidated trading profit for 1949 of £384,639, as compared with £369,164 for 1948, plus investment income of £11,862, making £396,501. After providing for depreciation, £42,747, directors' remunera-

tion, £36,743, United Kingdom income and profits tax, £159,960, and S.A. tax, £6,057, there is a net profit of £150,994 (against £138,106), to which is added £241,678 brought in, making £392,672. It is proposed to pay a second interim ordinary dividend, including bonus, of 17½ per cent (same), on increased capital, which with the interim of 5 per cent, makes 22½ per cent for the year (unchanged). Staff pensions receive £20,000, profit attributable to outside interests £954, and £308,702 is carried forward.

NEW COMPANIES

Vision & Sound Radio Services (London), Ltd.—Registered 15th April Capital £1,500. Directors: R. J. Toby, D. Standing and J. Toby. Regd. office: 30, Ely Place, E.C.1.

Simpson Store (Arnold), Ltd.—Registered 19th April. Capital £2,000. To acquire the business of an electrical retailer and contractor, radio and television engineer and hardware dealer, carried on by Olive R. Simpson at Arnold, Notts, as Simpsons. Directors: Mrs. Olive R. Simpson and H. C. Simpson. Regd. office: 1, High Street, Arnold, Notts.

Maygrove Electrical Co., Ltd.—Registered 18th April. Capital £100. Manufacturers of and dealers in electrical, fluorescent, gas and oil lamps, quartz lamps, reflectors, bells, fires, stoves, cookers, etc. Director: T. W. Edwards. Regd. office: 56, Maygrove Road, N.W.6.

J. Eliot (Electrical & Musical), Ltd.—Registered 18th April. Capital £5,000. General electrical engineers, manufacturers and importers of and dealers in domestic and industrial electrical apparatus and accessories, wireless and musical instruments, etc., J. H. C. Eliot is the first director. Regd. office: 448, Strand, W.C.2.

Wilfred Horsfall, Ltd.—Registered 14th April. Capital £3,000. Manufacturers and repairers of and dealers in electrical and mechanical apparatus and accessories of all kinds, etc. Directors: W. Horsfall and Mrs. Edith E. Horsfall. Regd. office: 111, Poulton Street, Kirkham.

Wolfson's Radio and Electrical, Ltd.—Registered 26th April. Capital £1,000. Directors: B. Wolfson and Mrs. Rose Wolfson. Regd. office: 157, Eastbank Street, Southport.

INCREASES OF CAPITAL

Cressall Manufacturing Co., Ltd.—Increased by £35,000, in £1 shares, beyond the registered capital of £15,000.

London Electrical Co. (Blackfriars), Ltd.—Increased by £50,000, in £1 ordinary shares, beyond the registered capital of £47,500.

Reliance Telephone Co., Ltd.—Increased by £275,000, in £1 ordinary shares, beyond the registered capital of £25,000. On 1st March, 1950, 225,000 shares were allotted to General Electric Co., Ltd., for cash.

Switchgear & Equipment, Ltd.—Increased by £40,000, in £1 ordinary shares, beyond the registered capital of £40,000.

J. Walton (Electrical), Ltd.—Increased by £23,000, in £1 shares, beyond the registered capital of £2,000.

Battery Carbons, Ltd.—Increased by £269,900, in £1 ordinary shares, beyond the registered capital of £100.

F. D. Sims, Ltd.—Increased by £25,000, in £1 ordinary shares, beyond the registered capital of £50,000.

Ashley Accessories, Ltd.—Increased by £20,000, in £1 ordinary shares, beyond the registered capital of £30,000.

Downes & Davies, Ltd.—Increased by £22,500, in £1 redeemable cumulative preference shares, beyond the registered capital of £60,000.

LIQUIDATIONS

W. Hampton (Stafford), Ltd.—Winding up. Liquidator, Mr. R. E. Clark, 17, Albion Street, Hanley, Stoke-on-Trent.

BANKRUPTCIES

A. Fielder, carrying on business at 314, Shortheath Road, Erdington, Birmingham, and at 4, Cooksey Lane, Erdington, Birmingham, under the style of A. Fielder & Co., radio and electrical retailer.—Receiving order made 3rd May on debtor's own petition. First meeting, 23rd May at the Official Receiver's office, Somerset House, 37, Temple Street, Birmingham. Public examination, 22nd June at the Court House, Corporation Street, Birmingham, 4.

G. A. Ince, carrying on business at 124, Higher Road, Urmston, Lancs, under the style of Higher Road Electrical, as an electrical and radio contractor.—Public examination 21st June at the Court House, Encombe Place, Salford.

E. B. Page, residing at 3, Peel Street, Hyde, Cheshire, and carrying on business at 10 and 12, John Street, Hyde, electrical engineer.—Last day for receiving proofs for dividend 26th May. Trustee, Mr. F. C. Ormrod, 20, Byrom Street, Manchester, 3, Official Receiver.

R. S. Warrell, trading as R. S. Warrell & Son, 2, Norfolk Road, Littlehampton, electrician.—Second and final dividend of 1¾d in the £, payable 23rd May, at 6 and 7, Old Steine, Brighton, 1.

FINANCIAL SECTION

STOCKS and SHARES

THE volume of business in Stock Exchange markets remains at a low ebb, but prices keep firm and the general tendency is on the whole upward. For this, one reason is the release of money which had been held up by General Election possibilities, and which now is seeking some kind of permanent employment in stocks and shares; scarcity of their supply becomes more and more noticeable. Good class preference shares, out of favour for some time past, are beginning to return into popular regard. The firmness of markets is a matter for surprise even to members of the Stock Exchange themselves, but the anomaly persists of prices of stocks and shares being good at a time when political unrest at home and abroad is so constantly in evidence.

British Electricity Stock

After a hesitant start, a premium of 7/16 per cent developed on the new 3 per cent British Electricity stock 1976/79, of which £150 million was issued, on 5th May at 99. It acquired popularity by virtue of being the only British Government obligation possessing the triple attributes of fixed (although distant) redemption terms; a price below par; and a current yield of a shade over £3 10s per cent. With these qualifications, the stock commended itself particularly to the trustee type of investor. Only £10 per cent was payable on applications for the stock; a call falls due for a further £25 per cent on Wednesday next, 24th May; the remaining three instalments are payable at two monthly intervals thereafter.

B.I.C.C. Report

The British Insulated Callender's Cables group has more than consolidated in 1049 the £2 million expansion of trading profits which materialized in 1948. This year's preliminary statement shows a further advance of £142,000 to £6.7 million. Taxation takes less at £3.1 million, and the final net profit after other charges and provisions comes out at £2.6 (against £2.3) million. It takes much less than the decimal figure to pay the preference dividend and a total of 6⅔ per cent, as before, on the ordinary, the latter distribution now being apparently covered almost eight times by group earnings. With the balance sheet matching the dividend position, so far as reserve strength is concerned, it is not surprising to find the £1 shares on a yield basis no higher than 4 per cent at the present price of 33s 3d.

A.E.I.

From the full accounts, Associated Electrical Industries' earnings for 1949 work out at 80 per cent on the ordinary capital, which received 15 per cent in dividend. This cost under half-a-million net, against £3½ million paid in tax and about £2¼ million ploughed back into reserves. The shares are a good market at 72s 6d, giving a yield of £4 2s 9d per cent.

Rising Prices

A good many price rises have taken place during the past week, some of them considerable. Aron Electricity Meter, for example, after their recent advance of 2s 6d, are 3s 9d to the good at 35s. Tube Investments at 5⅞ and English Electric 44s 6d are up ⅛. Gains have accrued to Mather & Platt, 52s (on the forthcoming bonus distribution of shares), Calcutta Trams, 27s 6d, and Ericssons, 46s 3d. Calcutta Electric Supply put on 1s to 24s 6d and Hoovers advanced similarly to 39s 6d; Cromptons, 12s, Decca, 14s, and Automatic Telephones, 58s 9d, also being 1s higher. Smaller improvements made Brush 6s 9d, Burco 20s 9d, Metal Industries 40s 9d, De la Rue 20s 9d, and Baldwins 5s 6d. The falls are mostly insignificant. Great Northern Telegraphs reacted to 14½ and I.T.T. to 28½. Scophony at 2s 6d are 6d lower.

Dividends and Results

British Thermostat 5s shares jumped a florin, to 26s 6d, on the dividend and preliminary profits statement. The profit for 1949 increased by £14,000 to £154,000, after tax. Holders of the ordinary shares benefit to the modest extent of the odd £4,000 net, through the raising of the dividend from a total of 25 to 30 per cent. Covered by earnings equal to about 180 per cent on the £150,000 equity capital, the distribution is in the most conservative rank. At their enhanced price, the 5s shares pay a trifle over 5½ per cent on the money.

Newman Industries 2s shares show little change, at 3s, on the profits statement, and the declaration of a 10 per cent dividend for the year, against 17½ per cent in the previous twelvemonth.

ELECTRICITY SUPPLY

Generation in April

Important Irish Developments

THE colder weather, accompanied by snow, which marked the last week in April, had its effect on electricity demand and a certain amount of load shedding had to be resorted to. At this time of the year the annual overhaul of plant is begun, but fortunately the recent cold snap was preceded by the commissioning of an exceptional number of new sets in March, when there was a net addition of 310,000 kW to the total capacity. Figures now published by the Ministry of Fuel and Power show that last month's total of electricity generated was 14.2 per cent more than in April, 1949, compared with the March increase of only 4.5 per cent, and the average for the year to date is brought up to 10 per cent. Plant put into service last month was confined to one Mitchell boiler of 180,000 lb/hr at Ferrybridge.

	Fuel Consumed Thousand Tons		kWh generated Millions			kWh sent out Millions	Installed capacity (m.c.r.) MW
	Coal	Oil	Steam	Water Power	Total*		
British Electricity Authority ...	2,479	4.3	4,153	37	4,205	3,966	13,789
North of Scotland	15	1.0	22	79	105	103	378
Total for April, 1950	2,494	5.3	4,175	116	4,310	4,069	14,167
Total for April, 1949	2,222	3.8	3,648	112	3,775	3,561	13,277
Increase, per cent	+12.2	+39.5	+14.4	+3.6	+14.2	+14.3	+6.7
Total for Jan-April, 1950	11,092	23.5	18,630	470	19,180	18,120	—
Corresponding total for 1949 ...	10,257	18.0	16,875	489	17,433	16,465	—
Increase or decrease per cent ...	+8.1	+30.6	+10.4	−3.9	+10.0	+10.1	—

* The total figure includes generation by oil engines, refuse destructors and waste heat plants amounting to 9 million, 0.2 million and 9.7 million kWh respectively in April, 1950.

Training Centre

The proposals for establishing a centre at the Queensferry power station for training craft apprentices in the Merseyside and North Wales Division have now been approved by the British Electricity Authority.

Another Irish Peat Station

Following the official opening of the Portarlington turf-fired station it is announced that the new 40,000 kW Allenwood station, Co. Kildare, is expected to be at least in partial operation at the end of next year. This station will be supplied yearly with 200,000 tons of turf from the adjoining Timahoe bog. Substantial progress has been made on the construction of buildings and the first of the four boilers has already arrived. One of the biggest of jobs is the construction of the peat store which will have a capacity of 45,000 tons of turf. The peat will be machine-won and air-dried for the specially designed boiler units. The cooling tower at the Allenwood station will be 286ft high with a base diameter of 205ft.

Ireland-Ulster Agreement

An agreement for the harnessing of the River Erne, which forms part of the boundary, has been entered into between the Northern Ireland Ministry for Finance and the Electricity Supply Board, Dublin, and will be embodied in legislation in Dublin and Belfast. The text of a Bill authorizing the E.S.B. to undertake drainage of the Lough Erne catchment area and erect the necessary works to develop hydro-electric power was issued last week.

Northern Ireland Rural Electrification

Recalling the fact that last year he had enjoined the Electricity Board to go forward with the development of supplies in rural areas as fast as materials would permit, the Minister of Commerce (Mr. W. V. McCleery) stated in the Northern Ireland Parliament last week that the Board was making good progress. In the first four months of the year the Board had approved 200 rural

schemes in all parts of Northern Ireland. These would bring supplies to 2,500 new consumers, including 741 farms, as well as over 1,600 rural dwellings and about 150 premises such as halls, shops and garages.

Many of the rural schemes which the Board was now preparing to carry out did not at present show promise of an economic return on the capital invested; the estimated revenue was often half of what the Board believed would be required to make the schemes self-supporting. He hoped that the rural community would progressively build up their demand to a level more nearly approaching the cost of supply.

The Ministry had approved a recommendation by the Joint Electricity Committee that four additional generating sets, each of a capacity of 30,000 kW, should be installed over a period from 1953 to 1957.

Hire of Refrigerators

Refrigerators at a hire charge of 1s 7d a week are to be offered to tenants of Council houses by Calne and Chippenham R.D.C. The total cost of each refrigerator in a scheme adopted by the Council in principle is £30 9s 7d, including provision of cabinet, fitting power plug and installation.

Assisted Wiring

The North Western Electricity Consultative Council, on 5th May, decided to recommend the Area Board to adopt the deferred payment system for the installation of electricity, in addition to the purchase of equipment. In a reply earlier the Area Board had said labour and material shortages, coupled with the all-round curtailment of capital expenditure, made it unlikely that such a scheme could be started in the near future. The Council expressed regret at the Board's reply, and asked that the pre-war scheme should be reinstituted to the extent of capital resources available.

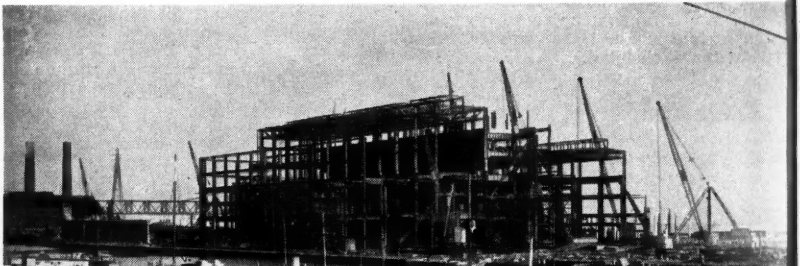
Exhibitions at Liverpool

Under the auspices of the District Joint Advisory Council, an Arts and Crafts Exhibition is being staged at Clarke Gardens, Liverpool, on 10th June, showing the handiwork of employees of the Merseyside and North Wales Division and Area Board, and their families; and the work and organization of the Division and Board. For students of Liverpool University and other educational bodies there will be an exhibition at the University from 20th to 23rd June, at which a special feature will be the training facilities for main transmission and generation. For the general public the Division's organization will be the subject of an exhibit at the Liverpool Flower Show, Wavertree Playground, from 10th to 12th August.

Joint Meter Readings

Rochdale Corporation Finance Committee has decided to make representations to the Minister of Fuel and Power with the object of securing the joint reading of gas and electricity meters, such as was customary in the town before nationalization. The North Western Electricity Consultative Council sent a letter expressing the view that it was both impracticable and uneconomic to arrange for joint meter readings.

This recent picture shows the progress made at the new Southwick (Brighton) power station



NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1939

18834. Murphy Radio, Ltd., and Hawkins, G. F.—Scanning circuits for television receivers. 3rd October, 1947. (639531.)

1943

16663. Sperry Gyroscope Co,, Inc.—Gyro-magnetic compasses. 11th October, 1943. (Addition to 638971.) (638991.)

1945

11858. General Electric Co., Ltd., and Sarson, A. E.—Apparatus for generating controlling voltages, for example for colour television. 13th May, 1949. (639322.)

19316. Banks, G. B.—Grids for thermionic valves, and the method of manufacturing them. 12th June, 1946. (639533.)

1946

11869. General Electric Co., Ltd., and Power, E. B.—Mercury vapour lamps. 29th April, 1949. (639536.)

13183. British Thomson-Houston Co., Ltd. (General Electric Co.).—Follow-up electric control systems. 1st May, 1946. (639537.)

15513. Damond, E. — Automatic weighing machine using electronic oscillatory means. 20th September, 1948. (Convention date not granted.) (639461.)

17233. Dehn, S. G. (Sunbeam Corporation).—Radiation thermostat control for toaster. 6th June, 1946. (639393.)

19069. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Electrical switching devices having arc-preventing arrangements. 26th June, 1946. (639394.)

19593. Bush Radio, Ltd., Harrison, W. H., and Wright, K. M. B.—Television systems, and the like. 1st July, 1947. (639541.)

20243. Standard Telephones & Cables, Ltd.—High-frequency electron-discharge apparatus. 6th July, 1946. (639395.)

25505. Régie Nationale des Usines Renault.—Electrical measuring, regulating, indicating, or the like devices. 26th August, 1946. (639325.)

27906. Compagnie Générale de Télégraphie sans Fil.—Electron and other negatively charged particle discharge tube arrangements. 17th September, 1946. (639396.)

28585. Telegraph Construction & Maintenance Co., Ltd., Randall, W. F., and Scholefield, H. H.—Heat-treatment of magnetic alloys containing iron. 24th October, 1947. (639252.)

31492. Philips Lamps, Ltd.—Luminescent screens. 3rd October, 1946. (639397.)

32387. British Thomson-Houston Co., Ltd. (General Electric Co.).—Light-impulse systems. 31st October, 1946. (639253.)

34332. White, E. L. C., and Newman, E. A.—Thermionic valve amplifiers utilizing electron multiplier valves. 15th October, 1947. (639543.)

34916. Patelhold Patentverwertungs- & Elektro-Holding Akt.-Ges.—Methods of and means for producing time-modulated pulses. 25th November, 1946. (639254.)

1947

30. Ellis, G. B.—Electronic indicator circuit. 1st January, 1947. (639255.)

31. Ellis, G. B.—Capacity-balance system for locating or indicating the proximity of conducting bodies. 1st January, 1947. (639256.)

1377. Sperry Gyroscope Co., Inc.—Electrical amplifying systems. 15th January, 1947. (639328.)

3224. Pieper, A. F.—Electric lighting means. 3rd February, 1947. (639547.)

3836. Standard Telephones & Cables, Ltd.—Automatic volume control systems. 10th February, 1947. (639549.)

5312. Metropolitan-Vickers Electrical Co., Ltd., and Scoles, G. J.—Electronic circuit arrangements. 20th February, 1948. (639553.)

9736. Corning Glass Works.—Glass with electrically heated coatings. 11th April, 1947. (Cognate application 9737, 18th December, 1946.) (639561.)

9797. Cole, Ltd., E. K., and Evans, J. N. I.—Method of coating the v.treous envelope of an electric-discharge device with a fluorescent powder. 16th March, 1948. (639330.)

9893. British Thomson-Houston Co., Ltd.—Lamp-holders for circular tubular electric lamps. 14th April, 1947. (639562.)

10241. Metropolitan-Vickers Electrical Co., Ltd., and Scoles, G. J.—Thermionic valve amplifiers. 12th April, 1948. (639402.)

12134. Radio Corporation of America.—Pulse-producing in radio-pulse transmitter systems. 5th May, 1947. (639565.)

12469. Submarine Signal Co.—Devices for measurement of time intervals. 8th May, 1947. (639259.)

13154. Radio Corporation of America.—Voltage-controlling circuit arrangements for vacuum tube bias control and similar purposes. 15th May, 1947. (639567.)

13231. Standard Telephone & Cables, Ltd.—Filament supports for thermionic vacuum tubes. 16th May, 1947. (639568.)

16310. British Thomson-Houston Co., Ltd.—Beam antenna systems. 20th June, 1947. (639469.)

16771. Semperit Gummiwerke Akt.-Ges.—Electrically heated stamping plates for stamping presses. 25th June, 1947. (639331.)

16956. Collard, J.—Wavemeters. 10th June, 1948. (639410.)

18097. Sanville, F. E.—Electrically operated reciprocating mechanism. 8th July, 1948. (639472.)

18194. Telegraph Construction & Maintenance Co., Ltd., Mildner, R. C., and Barnes, A. A. W.—Uniting of polythene and like substances with other minerals. 9th July, 1948. (639575.)

18376-80. Carrier Engineering Co., Ltd.—Refrigeration systems. 10th July, 1947. (639413-17.)

19306. Westinghouse Electric International Co.—X-ray apparatus. 18th July, 1947. (639579.)

20114. British Thomson-Houston Co., Ltd. (General Electric Co.).—Filament-forming apparatus. 25th July, 1947. (639583.)

21076. Sylvania Electric Products, Inc.—Electrode mount assemblies for electric gaseous discharge devices. 1st August, 1947. (639584.)

21098. British Thomson-Houston Co., Ltd.—Angular motion transmitting apparatus. 1st August, 1947. (639475.)

21193. Dole Refrigerating Products, Inc.—Refrigerating apparatus. 5th August, 1947. (639585.)

21763. Western Electric Co., Inc.—Electric wave translating devices. 7th August, 1947. (639476.)

21828. Electroflo Meters Co., Ltd.—Liquid-level gauges. 8th August, 1947. (639477.)

23578. Hazeltine Corporation.—Pulse-discriminating systems. 26th August, 1947. (639588.)

23672. Philips Electrical, Ltd. — Indirectly heated cathodes. 27th August, 1947. (639589.)

24481. English Electric Co., Ltd., and Barlow, K. F.—Electrode feed control apparatus. 3rd September, 1948. (639421.)

24654. Standard Telephones & Cables, Ltd., and Leno, J. A.—Inductive electrical windings. 3rd September, 1948. (639591.)

27581. General Electric Co., Ltd., Hayes, A. G., McKeag, A. H., and Ranby, P. W. — Luminescent screens for use in conjunction with cathode-ray tubes. 14th October, 1948. (639272.)

28167. Every, C. E. (Titanium Alloy Manufacturing Co.).—Methods of preparing dielectric materials. 21st October, 1947. (639273.)

29546. Evershed & Vignoles, Ltd., and Needham, J. C.—Electrically operated devices for indicating and measuring the level of liquids. 24th September, 1948. (639339.)

29618. Metropolitan-Vickers Electrical Co., Ltd., Higham, E. H., and Quarmby, E.—Frequency measuring apparatus. 19th October, 1948. (639275.)

30351. Omes, Ltd., and Mora, G.—Electrical upsetting apparatus. 15th November, 1948. (639277.)

31451. General Electric Co., Ltd., and Clack, B. N. —Electric-discharge devices. 26th October, 1948. (639428.)

32058. Telefonaktiebolaget L.M. Ericsson.—Devices for indicating the busy condition in electromagnetic connecting devices. 4th December, 1947. (639340.)

32103. Automatic Telephone & Electric Co., Ltd., and Cannon, J. R.—Electrical measuring apparatus. 23rd November, 1948. (639282.)

1948

198. Every, C. E. (Stein, F. W.).—Cell for measuring the electrical characteristics of materials. 2nd January, 1948. (639285.)

391. Gilbert & Barker Manufacturing Co.—Photo-electrically controlled oil burners. 6th January, 1948. (639484.)

1847-8. Philips Electrical, Ltd. — Manufacture of anisotropic permanent magnets. 21st January, 1948. (639488-9.)

2343. Elliott Bros. (London), Ltd., and Hawkes, H. D.—Electrical apparatus embodying variable inductances. 26th January, 1949. (639287.)

4834. Thorn Electrical Industries, Ltd., and Waigh, D. T.—Supply circuits for electric-discharge tubes. 8th February, 1949. (639295.)

6414. Kooperativa Forbundet, Forening, U. P. A., and Brander, B. J.—Motor-driven dry shaver. 1st March, 1948. (639298.)

6436. Naamlooze Vennootschap Philips' Gloeilampenfabrieken. — Circuit arrangements of the kind comprising a crystal oscillator. 1st March, 1948. (639299.)

6500. Ericsson Telephones, Ltd., and Distin, L. S.—Polarized electromagnetic interrupters. 1st March, 1949. (639300.)

7590. British Thomson-Houston Co., Ltd.—Circuit arrangements for electric gas-discharge lamps. 12th March, 1948. (639441.)

9023. Daby (Condensers), Ltd., and Walker, H.—Manufacture of electrolytic condensers. 30th March, 1949. (639357.)

9889. British Thomson-Houston Co., Ltd.—Starting circuits for electric-discharge lamps. 8th April, 1948. (639445.)

10767. British Thomson-Houston Co., Ltd., and Castellain, A. P.—Coloured television. 9th June, 1949. (639361.)

13518. Allmanna Svenska Elektriska Aktiebolaget.—Arrangement for obtaining adjustable preset time-lag opening or closing of an electric circuit. 19th May, 1948. (639497.)

13559. Clementson, S. P.—Electric current regulator. 15th June, 1949. (639309.)

14227. British Thomson-Houston Co., Ltd.—Steam or gas turbines with more than two cylinders. 26th May, 1948. (639311.)

16215. Holophane, Ltd., and English, S.—Lighting fittings. 16th June, 1948. (Addition to 599685.) (639369.)

16775. Evershed & Vignoles, Ltd., and Marchment, W. T.—Position indicators. 22nd June, 1949. (639370.)

16793. British Telecommunications Research, Ltd., and Baker, G. T.—Mounting arrangements for small electric circuit components. 10th March, 1949. (639453.)

17393. Bolsover, W. S.—Means for locating excessive current leakages from the live rails and in electrically propelled vehicles of electric railways. 2nd June, 1949. (639316.)

19162. Associated Electrical Industries, Ltd., and Haine, M. E. — Smoothing circuits. 23rd May, 1949. (639375.)

19898. Chamberlain, J.—Dry plate rectifiers and photocells. 26th July, 1948. (639381.)

19916. Sulzer Freres Soc. Anon.—Rotors for turbo machines. 26th July, 1948. (639382.)

19998. Hawkins & Co., Ltd., L. G., and Hawkins, L. G.—Tables, trolleys, or the like. 23 August, 1949. (639384.)

20430. Morris Motors, Ltd., Bridle, J. H., and Brown, R. J.—High-frequency induction heating apparatus. 11th June, 1949. (639600.)

20531. Brightside Foundry & Engineering Co., and Udall, W.—Rolling mills. 3rd August, 1948. (639502.)

20634. Rebut, P. C.—Vibrators, and more particularly high-frequency vibrators. 4th August, 1948. (639504.)

20927. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Measuring instruments. 9th August, 1948. (639508.)

20931. Philips Electrical, Ltd.—Electrical condenser combinations. 9th August, 1948. (639509.)

20946. British Thomson-Houston Co., Ltd.—High-frequency electrical heating methods and apparatus therefor. 9th August, 1948. (639510.)

21182. Plessey Co., Ltd., and Keir, L.—Holders for thermionic valves and the like. 13th July, 1949. (639518.)

21285. Hindle Smart & Co., Ltd., and Smart, R. E. —Electrical testing appliances. 29th July, 1949. (639521.)

21588. Connollys (Blackley), Ltd., and Travis, W.—Insulated electric conductors. 15th August, 1949. (639525.)

27542. Metropolitan-Vickers Electrical Co., Ltd., and Harris, F. R.—Mounting of turbine, compressor or like blades. 12th September, 1949. (639320.)

28417. Grotefeld, H. W. G., and Small, C. J. P.—Manufacture of insulated ribbon conductor. 2nd November, 1948. (639389.)

NEXT WEEK'S EVENTS

Monday, 22nd May

LONDON.—Savoy Place, W.C.2, 7 p.m. I.E.E. London Students' Section. Annual general meeting.

Tuesday, 23rd May

LEEDS.—I.E.E. North Midland Section. Annual golf competition at Sandmoor Golf Course

LONDON.—Connaught Rooms, W.C.2, 12.30 for 1 p.m. Electric Vehicle Association of Great Britain. Annual luncheon.

Wednesday, 24th May

HASTINGS.—Queen's Hotel. Electrical Contractors' Association. Annual Conference. (Continued on 25th and 26th May).

LONDON.—Savoy Place, W.C.2. I.E.E. Supply Section. Conversazione.

Thursday, 25th May

LONDON.—Savoy Place, W.C.2, 5.30 p.m. Institution of Electrical Engineers. Annual general meeting.

Friday, 26th May

GLENEAGLES.—I.E.E. Scottish Centre. Spring meeting. (Continued until 29th May.)

PITLOCHRY.—I.E.E. North-Eastern Students' Section. Joint visit to hydro-electric stations with the Institutions of Mechanical and Civil Engineers. (Continued until 29th May.)

Saturday, 27th May

SUTTON COLDFIELD.—British Institution of Radio Engineers. Visit to Sutton Coldfield Television Station.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Ashton-under-Lyne.—31st May. Corporation. Electrical wiring in ninety-six houses. (See this issue.)

Australia.—QUEENSLAND.—16th August. State Electricity Commission. 2,500 kW steam turbo-alternator for Hume Street power station, Mackay. (C.R.E. (I.B.) 52402/50. Ten/1259.)*

VICTORIA.—9th June. State Electricity Commission. One turbidimeter. (See 12th May issue.)

Breconshire.—County Council. Electrical installations in schools. (See 12th May issue.)

Bridgewater.—27th May. Corporation. Public lighting of certain streets in the borough. (See this issue.)

Edinburgh.—21st June. North of Scotland Hydro-Electric Board. 132 kV overhead transmission lines. (See 12th May issue.)

Erith.—31st May. Borough Council. Self contained, electrically operated deep well pumping unit, at the public baths (deposit: £2 2s). Particulars from J. H. Clayton, borough surveyor, Council Offices.

Eston.—20th June. U.D.C. Street lighting units. (See this issue.)

Halifax.—31st May. Corporation. Electrical work at the schools' swimming centre, Park Road Baths. (See this issue.)

Manchester.—6th June. City Education Committee. Electrical engineering equipment for the extension of the Municipal College of Technology. (See 12th May issue.)

New Zealand.—WELLINGTON.—2nd June. Post & Telegraph Department. Supply of 500,000 rubber insulated rings. (C.R.E. (I.B.) 52591/50. Ten/1265.)* Fifty multi-range meters. (C.R.E. I.B.) 52593/50. Ten/1268.)*

Peterborough.—City Council. Electric lighting and power installations in 12 old people's dwellings and 32 single bedroom flats. (See 12th May issue.)

Southern Rhodesia.—SALISBURY.—4th July. Electricity Supply Commission. Transformers. C.R.E. (I.B.) 51709/50. Ten/1238.)*

Slough.—31st May. Corporation. Improved trunk road lighting scheme (See 12th May issue.)

Sunderland.—1st June. Education Authority. Electrical installations in various schools. (See 12th May issue.)

Wiltshire.—14th June. County Council. Machines, tools and equipment at Chippenham Secretarial College. (See 12th May issue.)

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

ORDERS PLACED

Dalkeith. — Corporation. Installation of sodium discharge street lighting on Trunk Road A.68 (£1,347).—Revo Electric Co., Ltd.

London. — L.C.C. — Education Committee. Electrical installation works at Hammersmith Day College (£1,172).—Edmundsons Electric Co. Electrical work at Lewisham Day College (£696). Cropley Bros.

Longbenton U.D.C.—Electrical installations in seventy-two houses at Annitsford, Seaton Burn and Hazlerigg.—Tomkins & Stubbs.

Manchester.—Corporation Education Committee. Electrical installation at Old Hay Drive Secondary School.—H. J. Cash & Co., Ltd., Electrical installation in the extension to the College of Technology.—A. E. Sudlow & Co., Ltd.

Worcestershire.—County Council Education Committee. Renewal and improvement of electrical installations at Stourbridge Art & Technical School (£637) and Prince Henry's Grammar School, Evesham (£654).—Lee, Beasley & Co.

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Banbury.—County modern school for Oxfordshire C.C.; county architect, 3, Becket Street, Oxford.

Bath.—County junior mixed school, Newbridge Hill, Weston; city architect, Guildhall.

Birmingham.—Dairy, etc., for Co-operative Society; architects, Works Department, Woodcock Street, Birmingham, 4.

Blackburn.—Neighbourhood unit (1,000 dwellings) at Shadsworth; W. Pickstone, borough engineer.

Bolton.—Houses (320), Oldhams estate; housing director.

Bridgwater.—Houses (56), Montacute's Field site; borough surveyor.

Brockhall (Lancs.).—Staff houses (20) at Hospital; Pius A. Baines & Son (Preston), Ltd., Preston.

Burnley.—Houses (38), Brunshaw estate; borough surveyor, 22-24, Nicholas Street.

Camborne.—Houses (40) and 60 maisonettes, Treleigh estate; U.D.C. surveyor.

Carmarthen.—Houses (68), Ring Road; G. Lewis, builder, 34a, Priory Street.

Chelmsford.—Flats (52), Melbourne Park and Woodhall estate; borough engineer, Duke Street.

Chester.—Houses (54), Blacon; Thos. Warrington & Sons, Ltd., Park Drive, Hoole, Cheshire.

Chigwell.—Flats in 19 two-storey blocks, Roding Valley estate, for U.D.C.; Tooley & Foster, architects, Midland Bank Chambers, Buckhurst Hill.

Chislehurst.—Boys' school for Kent E.C.; E. D. Lyons & Israel, architects, 72, New Cavendish Street, W.1.

Corby.—Infants' school (£43,000); Northants county architect, Northampton.

Crawley.—Houses (158), West Green, for Development Corporation; C. A. C. Turner, chief executive, Broadfield, Crawley, Sussex.

Houses (129), West Green; chief architect, Crawley Development Corporation, Broadfield.

Crewe.—Houses (11), Middlewich Street estate; Preston & Owens, Ltd., Thomas Street.

Croydon.—Block of 38 maisonettes, Campden Road; Caterford Estates, Ltd., 91, Coombe Road.

Dudley.—Houses (164), Sledmere estate; Webb & Gray, architects, 200, High Street.

Durham.—Houses (46), for City Council; W. Norman, West Lane, Chester-le-Street, Co. Durham.

Eastbourne.—Flats (24), Bourne Street; borough surveyor.

Factory, Brampton Road trading estate; William Harden, Ltd., 38, Grove Road.

Transport depot extensions (£60,000); borough engineer.

Exeter.—Bank premises, etc., High Street; Lloyds Bank, Ltd., 71, Lombard Street, E.C.3.

Gainsborough.—Houses (42), and 12 bungalows, White's Wood Lane, for U.D.C.; William Saunders and Co., architects, 24, Castle Gate, Newark-on-Trent.

Gateshead.—Additions to welfare buildings (£50,100); chief architect, Municipal Buildings.

Glasgow.—Factory extensions; Beatties Biscuits, Ltd., Drumchapel.

Primary school, Springboig; John Keppie & Henderson, architects, 196, West Regent Street.

Houses (850), Cadder Road area; Scottish Special Housing Association, Ltd., 15, Palmerston Place, Edinburgh.

Newspaper office extensions; T. Gray, architect, 7, Ward Road, Dundee.

Gosforth.—Houses (66), Regent Farm estate, for the U.D.C.; M. J. Liddell and Sons, builders, 36, Great North Road, Newcastle.

Hebburn.—Houses (50) and 10 bungalows for U.D.C.; T. A. Page, Son & Hill, 75, King Street, South Shields.

Herne Bay.—Flats (40), Victoria Park; U.D.C. surveyor.

Hornsea.—Houses and flats (74), Burton estate, for U.D.C.; A. C. Blackmore and Co., architects, Ruskin House, Princes Avenue, Hull.

Hull.—County secondary school, Hedon-Preston, for East Riding E.C.; chief education officer, County Hall, Beverley.

Rebuilding departmental stores (£400,000) for Hammonds, Ltd.; T. P. Bennett and Son, architects, 43, Bloomsbury Square, London, W.C.1.

Ilford.—Works extensions; Bradley & Burch (Ilford), Ltd., Imperial Works, Sunnyside Road.

Flats (83), Little Gearies site; K. F. B. Nicholls, town clerk, Town Hall.

Distributive milk depot, Eastern Avenue and Ley Street; London Co-operative Society, Ltd., 54, Maryland Street, E.15.

Kettering.—Two-storey junior school, Avondale, and three-storey secondary school, Henry Gotch site; county architect, County Hall, Northampton.

Kidderminster.—Carpet factory; Morris and Co., Ltd., Viaduct Works, Hoobrook.

Leeds.—Firemen's houses (20) and 404 others on various sites; city architect.

Development and enlargement of Seacroft Hospital; Leeds Regional Hospital Board, 29, Eastgate.

Leigh.—Houses (20), Hand Lane site; borough surveyor.

Leighton Buzzard.—Block of eight shops and four flats, Clarence Road, for U.D.C.; Fleet & Roberts, Ltd., builders, 33, New Street, Aylesbury.

London.—Reinstatement of three floors, etc., Amour Union House, St. Martins le Grand (£170,000); Gunton and Gunton, architects, Empire House, St. Martins-le-Grand.

PADDINGTON.—Dwellings (40), Church Street, for Housing Committee; borough engineer, W.2.

MAYFAIR.—Block of flats, Green Street & Dunraven Street; F. & H. F. Higgs, Ltd., builders, Station Works, Hinton Road, S.E.24.

FINSBURY.—Transport repair and maintenance shops, garages, etc., New River Head; Metropolitan Water Board, 173, Rosebery Avenue, E.C.1.

TOOTING.—Two four-storey blocks (48 flats), Hazelhurst Road, for Wandsworth B.C.; Basil Hughes, architect, 34, Queen Anne Street, W.1.

Maidstone.—Three-storey block of showrooms and offices, 6/8, Mill Street; Pearl Assurance Co., Ltd., Holborn, W.C.1.

Manchester.—Research station, Southern Industrial Area, Wythenshawe Estate; British Rayon Research Association, Barton Dock Road, Urmston.

Further 339 houses and 150 cottage flats and 38 maisonettes, Northern Etchells; city architect.

Extensions to factory of J. Lee & Co., Ltd., Longley Lane, Northenden; H. Brocklehurst, architects, 10, Norfolk Street, Manchester.

Markinch (Fife).—Houses (118), Woodside, for Glenrothes Development Corporation; secretary, Auchmuty House, Markinch.

Milford Haven.—Cinema, shops and flats, Picton Road and Wellington Road; H. E. Wright, Royal Gate House Hotel, Tenby.

Public hall, Hamilton Terrace, for U.D.C.; C. Holden Smith, architect, Norwich Union Chambers, Congreve Street, Birmingham.

Newbury.—Renewal of electric wiring at Corn Exchange; borough engineer.

Newcastle-under-Lyme.—Foundry at Molditch for J. T. Price and Co., Ltd., Wood, Goldstraw & Yorath, architects, Stoke-on-Trent.

Houses (20), Lower Milehouse Lane, Cross Heath, A. Jones, Chesterton.

Newcastle-on-Tyne.—Mineral water factory, The Fossway, for R. Deuchar & Co.; S. H. Lawson, Emerson Chambers.

Extensions to factory, Cheviot View, for Landauer & Co.; Dickinson Bros., 30, Cloth Market.

Factory for Essen, Ltd., City Road; J. W. Taylor & Son, Gallowgate.